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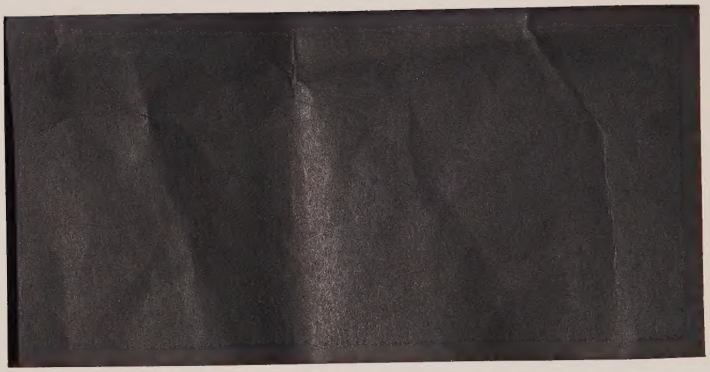
MAINTENANCE MANUAL
for
RADIO FREQUENCY MODULE
MODEL RFM-10E
(For use with the Model FM-10C(S) Mainframe)
Manual No. 1-500783-329
(For use with Serial Numbers 101 and above.)

EATON Advanced Electronics

Eaton Corporation
Electronic Instrumentation Division
Los Angeles, California 90066



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(For use with Serial Numbers 101 and above.)

This manual refers directly to serial numbers 101 and above.

For operating instructions refer to Model FM-10C Operator's Manual No. 1-500783-258 (Rev B) or later, or Model FM-10CS Operator's Manual No. 1-500783-313.

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Section I
THEORY OF OPERATION

1.1 INTRODUCTION

This section consists of the circuit description of the Model RFM-10E plug-in module. The information is presented to assist the user in the troubleshooting and maintenance of the instrument. Refer to the Detailed Block Diagram, Figure 1-1, and the Schematic Diagrams, Figures 4-1 thru 4-6.

1.2 GENERAL

The Model RFM-10E plug-in module derives its power supply and RF signal inputs via the rear connectors, P2 and P1. The instrument is energized whenever the Mainframe is operating.

Six major assemblies are contained in this unit: Broadband Amplifier Assembly, A1A2; 11 MHz IF Assembly, A1A3; Broadband Amplifier/Mixer/Detector Assembly, A1A4, 700 MHz Multiplier Assembly, A1A5, Diode Switch Assembly, A1A6, and High-Pass Filter Assembly, A1A7. The circuitry of the Model RFM-10E will be explained according to the functions of the Mainframe MODE switch: GEN, MEAS, GEN MOD CAL, and TONE GEN.

1.3 DETAILED THEORY

1.3.1 Generate Circuitry (Mainframe MODE switch set to GEN)

The Mainframe synthesizer (0.05 to 512 MHz) output enters the Model RFM-10E module via connector, P1, and is amplified by the 39 dB broadband amplifier, A1A4Q1 thru A1A4Q8. Level detector diode, A1A4CR1, rectifies this signal and returns a dc level proportional to the RF level to the AGC amplifier in the Mainframe via connector, P2-3, for automatic leveling.

The output of the 39 dB broadband amplifier is also brought to the RF OUTPUT receptacle J1, through a 110 dB attenuator, AT1, and an RF fuse, RFF-10.

Diode switches A1A6CR2 thru A1A6CR5 are in the (gen) position and prevent the BBA signal from being radiated through the MEASURE INPUT receptacle, J2.

When using the low band frequency range, the RF output signal is available at the RF OUTPUT 0.05 – 512 MHz receptacle, J1.

When using the high band frequency range, the RF signal from the RF OUTPUT 0.05 – 512 MHz receptacle, J1, is applied to the high band MIXER input/output receptacle, J3, by means of an external coaxial jumper cable. The RF signal 0.05 to 512 MHz (100 to 512 MHz actually) is mixed with a 700 MHz local oscillator signal in mixer, Z1, and up-converted to the high band signal of 800 to 1212 MHz, it passes through High Pass Filter, A1A7, to remove any low frequency components, and is available at the MEASURE INPUT/RF OUTPUT 800-1212 MHz receptacle, J4.

The 700 MHz local oscillator signal is derived from the Mainframe 10 MHz reference signal by 70X multiplication in the 700 MHz Multiplier Assembly, A1A5.

1.3.2 Measure Circuitry (Mainframe MODE switch set to MEAS)

When using the low band frequency range, the unknown signal enters the instrument via the MEASURE INPUT receptacle, J2, or when using the high band frequency range, the unknown signal enters the instrument via the MEASURE INPUT/RF OUTPUT receptacle, J4, and is applied to mixer Z1-R, through High Pass Filter A1A7. The 700 MHz local oscillator signal from the 700 MHz Multiplier Assembly A1A5 is applied to mixer Z1-L. The unknown signal is down-converted to 100 to 512 MHz in in the mixer, Z1, and appears at the X port where it is brought out to the front panel MIXER input/output receptacle, J3, from which it is connected to the low band MEASURE INPUT 0.05 – 512 MHz receptacle, J2, by means of an external coaxial jumper cable.

The unknown signal is then passed through the diode switches on assembly A1A6, when in the (MEAS) position, allowing the signal to pass to A1A2. The 20 dB Broadband Amplifier, A1A2, is energized and passes the signal to the mixer, A1A4Z1-X.

The frequency at the synthesizer input connector, P1 (rear panel), is 11 MHz higher than the frequency indicated by the Frequency switch positions, for the low band. For the high band, due to the 700 MHz shift created by the input mixer conversion, and the 11 MHz measure offset, the frequency at the synthesizer input connector, P1, is 689 MHz lower than the frequency indicated by the Frequency switch positions.

The synthesizer input signal at P1 is amplified by the 39 dB BBA and applied to the 4 dB BBA, A1A4Q9. The 40 dB pad is bypassed by diode switch, A1A4CR3, and the transistor switch, A1A4Q10, removes the 50 ohm load, A1A4R34, from the circuit. The output of the 4 dB BBA is applied to mixer, A1A4Z1-L, and the difference frequency (11 MHz) from A1A4Z1-R is applied to the 11 MHz bandpass filter on the A1A3 assembly. Diode switches, A1A3CR3 through A1A3CR6, are utilized to switch the 30 kHz crystal filter, A1A3FL1, in or out of the circuit and are operated by the MEASURE MODE BANDWIDTH switch, S2. In the narrow bandwidth (30 kHz), NARROW lamp, DS1, lights. The bandwidth in the WIDE position is approximately 200 kHz. After the diode switch, the signal is amplified by amplifier, A1A3Q6, which is tuned to 11 MHz, and applied to mixer, A1A3U1.

A 9 MHz signal from the Mainframe is applied to the other input port of the mixer via connector, P2-24, and a 9 MHz bandpass filter. The difference frequency (2 MHz) is applied to connector, P2-1, via a low pass filter and a 2 MHz buffer amplifier, A1A3Q9.

The MEASURE SENSITIVITY switch, S1, switches 30 dB of gain in or out of the circuit by switching the output of the 11 MHz amplifier, A1A3Q6. The MEASURE SENSITIVITY control, R1, controls the output of the 11 MHz buffer, A1A3Q7, throughout approximately 30 dB of range. The 2 MHz output is applied to the FIM module where it is mixed with 2.1 MHz to produce an IF of 100

kHz, which is applied to a pulse-counting discriminator and the error frequency, if any, will be indicated on the FIM module meter. Also the 100 kHz IF is mixed with 100 kHz in the FIM module to produce the error frequency, if any, which will be audible from the Mainframe speaker, or visible at the FIM module BEAT lamp.

1.3.3 Gen Mod Cal Circuitry (Mainframe MODE switch set to GEN MOD CAL)

The synthesizer input at connector, P1, is 11 MHz and is either frequency modulated or amplitude modulated by the right-hand module. This is amplified by the 39 dB BBA and applied to the mixer, A1A4Z1-L through the 4 dB BBA which is switched off at this time; therefore, the 40 dB pad attenuates the signal. The attenuated output is applied to the A1A3 assembly. At this time, mixer, A1A4Z1, is turned on via A1A4R44 and acts as a closed switch. The MEASURE MODE BANDWIDTH switch is bypassed by diode, CR1, so that the WIDE position is in use.

The 9 MHz is mixed with the modulated signal at mixer, A1A3U1, and the modulated 2 MHz IF signal is applied to the right-hand module where the modulation is detected.

Diode switches A1A6CR2 thru A1A6CR5 are in the (gen) position and prevent the BBA signal from being radiated through the MEASURE INPUT receptacle, J2.

1.3.4 Tone Generator Circuitry (Mainframe MODE switch set to TONE GEN)

In this mode the frequency of the synthesizer input at connector, P1, is "11 MHz +" (11 MHz plus any frequency switch position to the right of the 1 MHz decade switch). This frequency is amplified by the 39 dB BBA and applied to the mixer, A1A4Z1-L. The 4 dB BBA is switched out of the circuit by diode, A1A4CR3, and the attenuated output is applied to the A1A3 assembly. The MEASURE MODE BANDWIDTH switch is bypassed by diode, CR1, so that the WIDE position is in use. 9 MHz from the Mainframe is mixed with the signal producing a "2 MHZ +" IF signal. This "2 MHz +" IF signal is applied to the FIM module where it is mixed with 2.1 MHz producing a "100 kHz +" signal which is mixed with a 100 kHz signal from the Mainframe to produce the frequency set on the Mainframe Frequency switches to the right of the 1 MHz Frequency switch.

This frequency is available at the AUDIO TONE OUTPUT receptacle, J5, on the Mainframe.

Diode switches A1A6CR2 thru A1A6CR5 are in the (gen) position and prevent the BBA signal from being radiated through the MEASURE INPUT receptacle, J2.

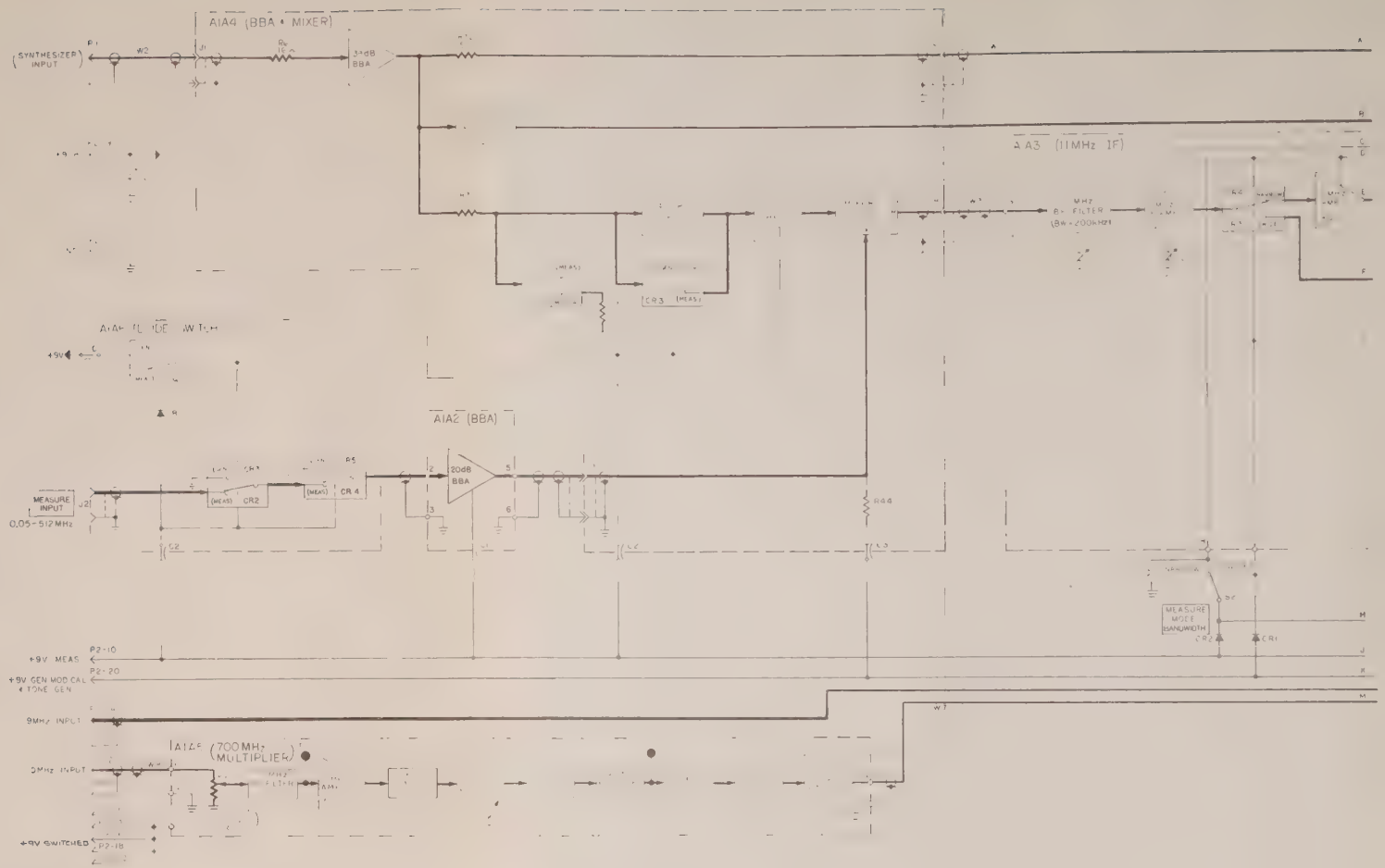

Figure 1-1. Detailed Block Diagram,
Model RFM-10E
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(Sheet 1 of 2)

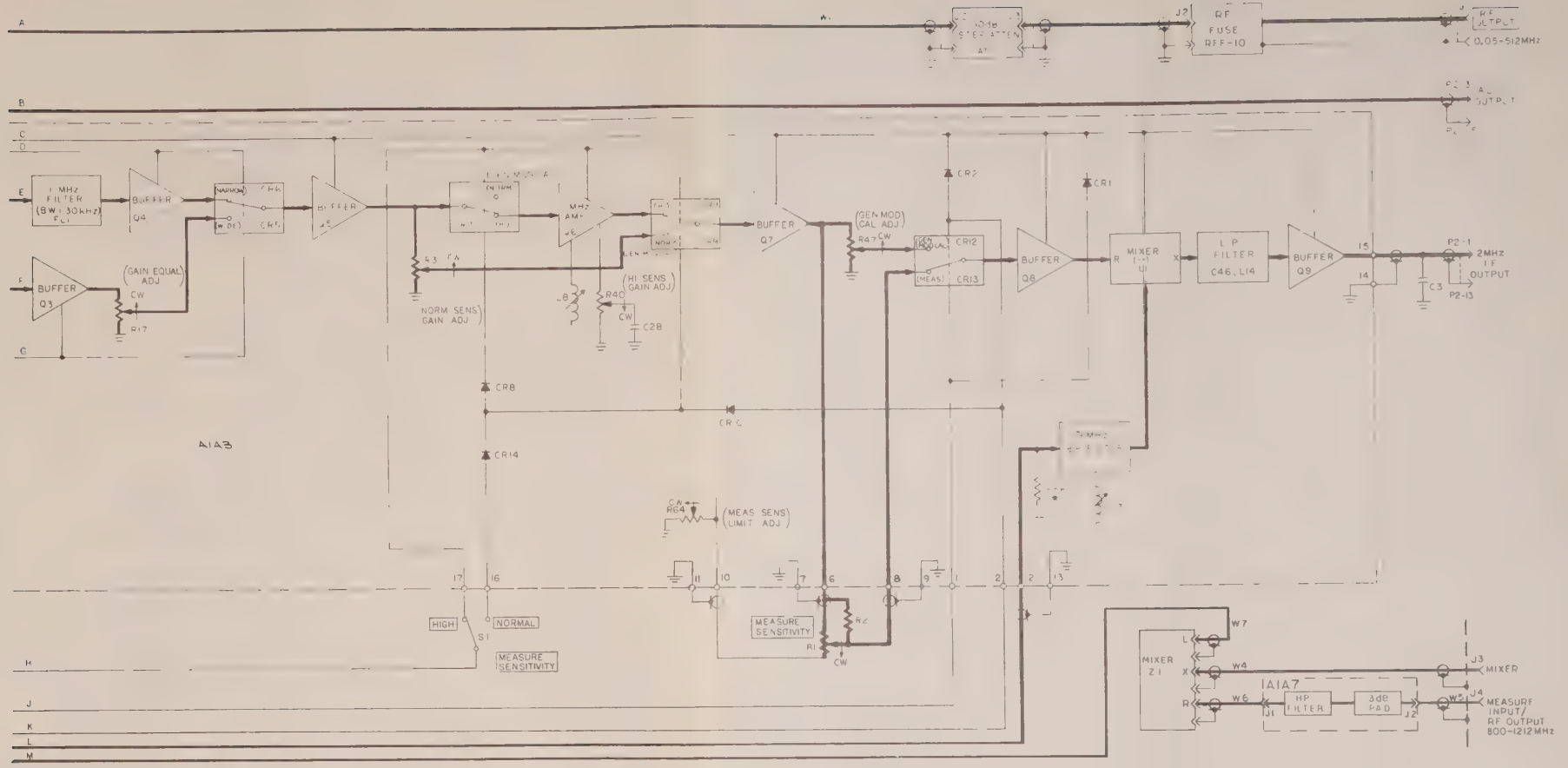

Figure 1-1. Detailed Block Diagram,
Model RFM-10E
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(Sheet 2 of 2)

Section II
MAINTENANCE

2.1 INTRODUCTION

This section contains information for the maintenance of the Model RFM-10E. Included are Minimum Performance Procedures, Alignment and Adjustment Procedures and Fault Isolation Procedures.

All ac and dc voltages displayed without tolerances on the Schematic Diagrams in Section IV are typical. The dc voltages may vary widely (+100%, −50%) and the ac voltages may vary widely (±6 dB) due to component tolerances and beta ranges of the transistors. This does not imply that instruments in which measured voltages are at the tolerance extremes will not perform to the specifications, since the instrument has been designed to allow for these tolerances.

2.2 PRELIMINARY INFORMATION

2.2.1 Alignment Interval

To ensure instrument accuracy check the Model RFM-10E performance using the Minimum Performance Procedures every 1000 hours of operation, or every six months if used occasionally.

2.2.2 AILTECH Customer Service

Both Factory and Field Centers provide instrument service and repair. Contact your local AILTECH representative for additional information.

2.2.3 Minimum Performance Procedures Defined

The performance of the instrument can be checked without removing the covers or performing internal adjustments by the use of the Minimum Performance Procedures, (Refer to Paragraph 2.4). These procedures do not test every detail of the alignment of the instrument but do check the overall performance for accuracy and correct operation within allowable tolerances.

2.2.4 Alignment and Adjustment Procedures Defined

The completion of each step of the Alignment and Adjustment Procedure, (refer to Paragraph 2.5), ensures that the instrument meets the electrical specifications provided in Section II of the Operator's Manual. For best overall instrument performance when performing a complete Alignment and Adjustment Procedure, adjust each trimmer as close as possible to the exact figure, even though the Minimum Performance Procedures indicate that the operation is within the allowable tolerance.

2.2.5 Interchangeability

The plug-in module interfaces have been designed to provide full interchangeability when both modules and Mainframes have been correctly aligned and adjusted. Factory procedures require numerous standard signal sources and standardized test fixtures to ensure interchangeability. However, to avoid excessive equipment requirements for field maintenance, this procedure utilizes some signals and power from the Mainframe, with certain steps included that are identified by parenthesis around the step; eg. (a), to verify Mainframe standardization and thus maintain interchangeability. A Mainframe standardized to these requirements may be retained as a module testing fixture if interchangeability is required. However, if the Mainframe and module under test are intended to be used together exclusively, with no need for interchangeability, the procedure may be shortened by omitting these standardization steps.

2.3 TEST EQUIPMENT REQUIRED

The test equipment required for the Minimum Performance Procedures, Alignment and Adjustment Procedures and Fault Isolation Procedures is listed in Table 2-1. Minimum specifications are provided to aid in the selection of equivalent types.

2.4 MINIMUM PERFORMANCE PROCEDURES

The Minimum Performance Procedures provide a convenient verification of overall performance of the main functions of the Model RFM-10E when installed in a Model FM-10C(S) Mainframe, and may be used initially to determine the need for alignment and adjustment and also to verify the overall performance upon the completion of alignment and adjustment.

Since this procedure is performed with the module installed in a Mainframe, the results may be influenced by the alignment and adjustment of that particular Mainframe unless it has been standardized. (Refer to Paragraph 2.2.5, Interchangeability.)

2.4.1 Power Requirements

All power required by the Model RFM-10E is uspplied by the Mainframe.

NOTE

The equipment should be checked at a temperature of 25°C ±5°C for best overall performance.

2.4.2 Evaluation of Output Level

a. Install the Model RFM-10E into the Mainframe left-hand compartment. Connect the RF voltmeter with the 50 ohm termination to the RF OUTPUT (0.05 to 512 MHz) receptacle of the Model RFM-10E module. Set Mainframe Mode switch to GEN.

b. Set the RF OUTPUT control to −30 dBm.

c. Set the Mainframe Frequency switches to 250.0000 MHz and the 0−100 Hz control to the OUT position.

d. The RF voltmeter should indicate −30 dBm ±3 dB (5 mV to 10 mV).

e. Repeat Steps c. and d. at 50 kHz, 1 MHz, 10 MHz, 50 MHz and every 50 MHz up to 512 MHz.

f. Remove the RF voltmeter from the low band RF OUTPUT 0.05 – 512 MHz receptacle and connect it to the high band MEASURE INPUT/RF OUTPUT 800 – 1212 MHz receptacle.

Table 2-1. Test Equipment Requirements

Instrument	Minimum Specifications	Recommended		Use*
		Manufacturer	Model	
Sweep generator	Frequency range: 50 kHz to 1.2 GHz Output level: –41 dBm to 0 dBm Markers: 50 MHz and multiples to 500 MHz	Wavetek (Refer to Note in Paragraph 2.5.1)	2001	A
RF detector	Frequency range: 50 kHz to 512 MHz	Wavetek	D152	A
Signal generator	Frequency range: 50 kHz to 500 MHz Output level: –101 dBm to 0 dBm Output impedance: 50 ohms	AILTECH	FM-2748	A,M
Oscilloscope with 10 X probe	Frequency response: dc to 15 MHz Vertical sensitivity: 5 mV/cm Probe capacitance: 10 pF max.	Tektronix	454	A
Frequency monitor	Mainframe	AILTECH	FM-10C	A,M
Ac voltmeter	Frequency response: 50 Hz to 10 MHz Input level: 2 mV to 400 mV rms Input resistance: 1 megohm minimum Input capacitance: 35 pF maximum	Hewlett-Packard	400E	A,M
RF voltmeter with 50 ohm termination	Frequency range: 50 kHz to 1.2 GHz Input level: –56 dBm to +6 dBm Accuracy: ±1 dB	Hewlett-Packard (50 ohm tee) (50 ohm load)	3406A 11063A 6064	A,M
DC digital voltmeter	Input level: –17 mV to –23 mV Accuracy: ±1%	Hewlett-Packard	3440A	A
RFM extender cable	24 pin male to 24 pin female	AILTECH	PC-2652	A
Adapter cable No. 1	Push-on plug to BNC plug assembly 50 ohm coaxial cable 6-1/2 in. long	AILTECH Assy. Push-on jack BNC plug	1-004818 Gremar 8505A Trompeter PL-24	A
Adapter cable No. 2	Push-on jack to BNC jack 50 ohm coaxial 6 in. long	Push-on jack	Gremar 8212A	A
BNC cable	50 ohm coaxial 6 in. to 12 in. long	BNC plug	UG-88C/U	A
Resistor	200 ohms ±5% 1/4 W	Allen Bradley	CB2015	A

*A = Alignment & Adjustment and Fault Isolation

M = Minimum Performance

g. Connect the coaxial jumper cable (supplied with the Model RFM-10E) from the MIXER receptacle to the low band RF OUTPUT 0.05 – 512 MHz receptacle.

h. Set the RF OUTPUT – dBm control to –20 dBm.

i. Set the Mainframe Frequency switches to 800.0000 MHz.

j. The RF voltmeter should inciate –30 dBm ±5 dB (4 mV to 12.6 mV).

k. Repeat Steps i. and j. at 899, 900, 999, 1000, 1099, 1100, 1199 and 1212 MHz.

2.4.3 **Evaluation of Measure Mode Sensitivity**

a. Set the Mainframe MODE switch to MEAS, MEASURE MODE AUDIO OUTPUT switch to IN-BEAT NOTE, GENERATOR MODULATION switch to OUT-OFF and Frequency switches to 151 MHz.

b. Set the Model RFM-10E MEASURE MODE BANDWIDTH switch to OUT-WIDE. Set the MEASURE SENSITIVITY switch to NORMAL and MEASURE SENSITIVITY control to 0.064 mV rms.

c. Connect the signal generator to the Model RFM-10E MEASURE INPUT (0.05 to 512 MHz) receptacle. Set its frequency to 151 MHz and output level to 0.064 mV rms.

d. Connect the ac voltmeter to Pin A of the back panel AUX output receptacle (2 MHz If output). Vary the signal generator output level to obtain an output level indication of 2.7 mV rms on the ac voltmeter.

NOTE

Alternatively, a convenient indication of the output level may be obtained by observing the turn-on threshold of the OPERATE lamp on a Model FIM-1, FIM-3, or ODM-1, or "Red-line" indication on a Model MDM-1. However, the measurement accuracy may be reduced due to module tolerances and the condition of the module used.

e. The signal generator output level (the sensitivity) should be 0.064 mV rms ±3 dB (0.045 mV to 0.089 mV rms) (NORMAL range).

f. Disconnect the signal generator cable from the low band MEASURE INPUT 0.05 – 512 MHz receptacle, and connect it to the high band MEASURE INPUT/RF OUTPUT 800-1212 MHz receptacle.

g. Connect the coaxial jumper cable from the MIXER receptacle to the low band MEASURE INPUT (0.05 to 512 MHz) receptacle.

h. Set the Mainframe Frequency switches and the signal generator to 951 MHz.

i. Vary the signal generator output level to obtain an output level indication of 2.7 mV on the AC voltmeter, or equivalent (See NOTE above).

j. The signal generator output level (the sensitivity) should be 0.213 mV ±5 dB (0.120 mV to 0.378 mV) (NORMAL range). This is a 10 dB (3.33X) change in sensitivity from the low band.

2.5 ALIGNMENT AND ADJUSTMENT PROCEDURES

All limits and tolerances provided in this procedure are calibration guides, and should not be interpreted as instrument specifications except as listed as a performance requirement in the Specification section of the Operator's Manual. Where possible, instrument performance should be checked (Refer to Minimum Performance Procedures, Paragraph 2.4) before an adjustment is performed. For best overall instrument performance when performing the complete Alignment and Adjustment Procedure, adjust each trimmer as close as possible to the exact figure even though the Minimum Performance Procedures indicate that the instrument is operating within the allowable tolerance.

Prepare the Model RFM-10E for alignment and adjustment by removing the five screws at the back of the instrument and sliding the cover off. See Figures 2-1 thru 2-4 for test point and trimmer locations.

NOTE

The equipment should be aligned at a temperature of 25°C±5°C for best overall performance.

2.5.1 Broadband Amplifier Alignment (A1A4) (See Figure 2-1)

NOTE

The following procedure requires a sweep generator covering the frequency range 50 kHz to 512 MHz. Using Wavetek Model 2001 which is rated down to only 200 kHz, the additional range down to 50 kHz may be disregarded up to Step p., since flatness in this range is practically inherent in the design. However, if verification down to 50 kHz is required in Step p., use the signal generator to cover this additional range. In Step p., the generator(s) should be verified for flatness to within ±0.5 dB.

a. Connect the Model RFM-10E to the Mainframe using the RFM module extender cable.

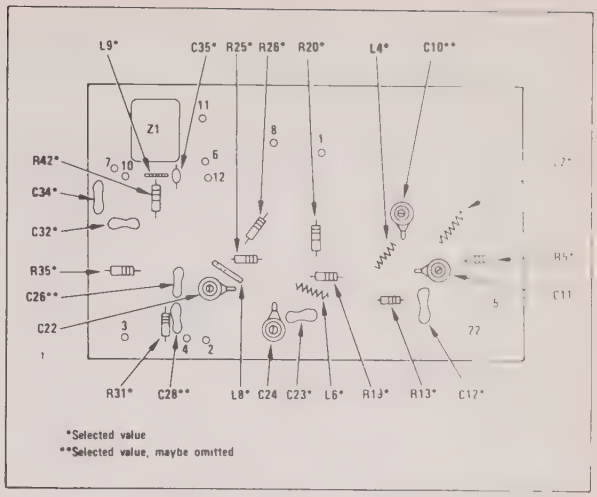


Figure 2-1. Trimmer Locations, Broadband Amplifier and Mixer Assembly, A1A4

b. Connect the sweep generator RF output receptacle to the back panel RF input connector, P1, on the Model RFM-10E using the push-on to BNC adapter cable No. 1 (Refer to Table 2-1).

c. Unsolder the positive lead of A1A4CR35 from the circuit board.

d. Disconnect BNC coaxial cable W1 from A1A4J2 and connect A1A4J2 to the detector RF input receptacle with a 6" to 12" 50 ohm BNC cable.

e. Connect the detector dc output to the sweep generator demodulator input receptacle.

f. Connect the sweep generator oscilloscope vertical receptacle to the oscilloscope vertical input receptacle using a 50 ohm coaxial cable.

g. Connect the sweep generator oscilloscope horizontal receptacle to the oscilloscope horizontal input receptacle using a 50 ohm coaxial cable. Turn on Mainframe power. Se the MODE switch to GEN.

(h.) Measure the dc voltage at P2-9 on the Model RFM-10E rear connector. Verify +9 V ±1%; adjust A1A3R16 in the Mainframe if necessary.

i. Set the sweep generator center frequency control to 250 MHz, sweep width to approximately 520 MHz, 50 MHz marker on, and output level to –33 dBm.

j. Set the oscilloscope timebase to external and adjust the horizontal and vertical amplitude controls and switches for a display that deflects approximately three-quarters of the oscilloscope graticule.

k. Vary the sweep generator marker amplitude controls to display the 50 MHz markers. Vary the center frequency control, if necessary, to display all 50 MHz markers between 50 kHz and 500 MHz.

l. Adjust trimmer capacitors A1A4C10, A1A4C11, A1A4C22 and A1A4C24, and select A1A4C12 and A1A4C23 for the flattest possible response

curve on the oscilloscope. Readjust as necessary as there is interaction between the adjustments. (A1A4C10 may be omitted.)

m. Individually short one or more turns of A1A4L2, A1A4L4, A1A4L6 and A1A4L8 together, using two insulated turning sticks, to obtain the flattest possible response from 50 kHz to 512 MHz. Solder the necessary turns together. Readjust the trimmer capacitors as necessary.

n. Individually select resistors A1A4R5, A1A4R13, A1A4R19 and A1A4R25 as necessary to obtain the flattest overall response. Decrease the resistance values to decrease the gain.

o. If the high frequency gain is too high or the amplifier has a tendency to oscillate, reduce the values of A1A4R20 and A1A4R26 until the required flatness at the high frequency end is obtained or the oscillations cease.

p. After the response curve is flat to within ±1 dB from 50 kHz to 512 MHz, disconnect the detector from A1A4J2 and connect the RF voltmeter with 50 ohm termination to A1A4J2. Set the sweep generator to the CW mode. The output level at A1A4J2 should be 0 dBm ±1 dB. Vary the sweep generator center frequency control from 50 kHz to 512 MHz. The level should not vary more than ±1.5 dB from 0 dBm.

q. Set the sweep generator center frequency to 250 MHz. Vary the sweep generator output level, if necessary, to obtain exactly 0 dBm on the RF voltmeter.

r. Disconnect the RF voltmeter from A1A4J2 and connect the 50 ohm BNC load to A1A4J2. Set the sweep generator to the Δf mode. Set the MODE switch to MEAS.

s. Solder the positive lead of A1A4C35 into its printed circuit pad connected to A1A4L9. Unsolder the negative lead of A1A4C35 from its printed circuit pad. Solder the center conductor of the BNC test cable to the negative lead of A1A4C35 and solder the shield to ground. Connect the detector to this BNC cable.

CAUTION

Do not short the case of A1A4Q9 to ground as it is internally connected to the collector.

t. Select the values of A1A4R42, A1A4C32 and A1A4C34 to obtain the flattest possible response. Capacitor A1A4C32 may be deleted if necessary.

u. Set the sweep generator to the CW mode. Set the center frequency to 250 MHz. The output level at A1A4J4 should be +4 dBm ±2 dB.

v. Unsolder the BNC cable from A1A4C35 and solder the negative lead of A1A4C35 to the printed circuit pad.

2.5.2 Amplifier A1A4 Compression Test

a. Disconnect the BNC to push-on cable adapter from the sweep generator RF output receptacle and connect it to the signal generator RF output receptacle.

b. Disconnect the BNC 50 ohm load from A1A4J2 and connect the RF voltmeter with 50 ohm termination to A1A4J2.

c. Set the signal generator frequency to 50 kHz and set the output level to produce 0 dBm on the RF voltmeter.

d. Increase the signal generator output level 6 dB. The RF voltmeter should indicate +5 dBm minimum.

e. Repeat Steps c. and d. at 1 MHz, 10 MHz, 50 MHz, and every 50 MHz up to 512 MHz.

2.5.3 ALC Detector Flatness Test and Adjustment

a. Connect the digital voltmeter to P2-3 of the 24 pin back panel connector (ground to the chassis). Open the line from pin 3 in the extender calbe to disconnect the Mainframe load from the ALC detector.

b. Set the signal generator frequency to 50 kHz and the output level to produce 0 dBm on the RF voltmeter and observe the digital voltmeter indication.

c. Select the value of A1A4R31 until the indication on the digital voltmeter is approximately −20 mV dc. (Increasing A1A4R31 increases the voltage.)

d. Set the signal generator frequency to 512 MHz and vary the output level to obtain 0 dBm on the RF voltmeter.

e. If the indication of the digital voltmeter is more negative than −23 mV dc, add capacitor A1A4C28 across A1A4R31 (value from 1 pF to 5 pF type DM−15 P/N 1-900003-XXX) until the voltage is approximately equal to that at 50 kHz. If the voltage is less negative than −17 mV dc, add capacitor A1A4C26 across A1A4R30 (value from 0.1 pF to 1.0 pF tubular type P/N 1-900066-XXX) until the voltage is approximately equal to that at 50 kHz.

f. Repeat Step b. at 1 MHz, 10 MHz, 50 MHz and every 50 MHz up to 512 MHz. Maintain the amplifier output level at 0 dBm at each frequency. The indication should be −20 mV ±3 mV. If necessary repeat Steps c. thru f.

g. Reconnect the pin 3 line of the extender cable.

2.5.4 700 MHz Multiplier Alignment (A1A5) (See Figure 2-2)

a. Set the Mainframe 100 MHz decade switch to 6, and set MODE switch to GEN.

b. Connect the oscilloscope 10 X probe to A1A5TP1. Adjust A1A5R1 to obtain a 10 MHz sine wave of 400 mV p-p.

c. Connect the oscilloscope 10 X probe to the collector of A1A5Q4. Adjust A1A5L1 for maximum amplitude at 20 MHz. If the amplitude is less than 6.5 V p-p, increase the value of A1A5C16 to obtain 6.5 V p-p minimum. If the value of A1A5C16 is too large, it will cause the A1A5Q3 stage to oscillate.

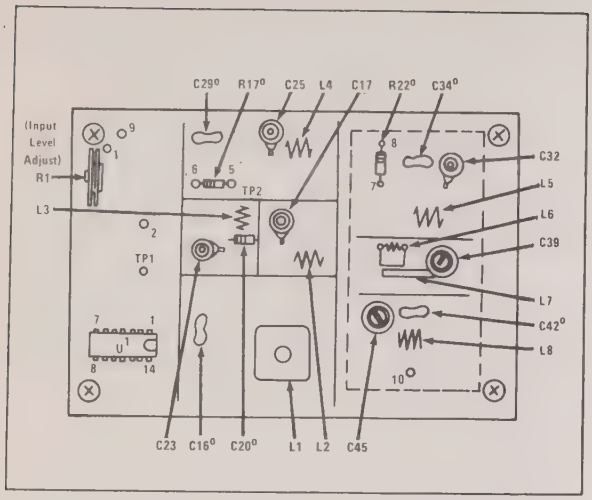


Figure 2-2. Trimmer Locations 700 MHz Multiplier Assembly, A1A5

d. Unsolder the tap from A1A5L2 and connect the BNC test cable through the 0.01 µF test capacitor to A1A5L2, approximately 1/2 turn from the grounded end. Connect the BNC connector to the sweep generator RF output receptacle.

e. Unsolder the tap from A1A5L3 and connect the BNC test cable through the 0.01 µF test capacitor to A1A5L3 approximately 1/2 turn from the grounded end. Connect the BNC connector to the detector RF input receptacle. Connect the detector dc output receptacle to the sweep generator demodulator input receptacle.

f. Connect the sweep generator oscilloscope vertical receptacle to the oscilloscope vertical input receptacle using a 50 ohm coaxial cable. Connect the sweep generator oscilloscope horizontal receptacle to the oscilloscope horizontal input receptacle using a 50 ohm coaxial cable. Turn on Mainframe power. Set the MODE switch to GEN.

g. Set the sweep generator to sweep between 125 MHz and 155 MHz, output level to 0 dBm, and 50 MHz markers on.

h. Set the oscilloscope horizontal and vertical controls for a display that deflects approximately three-quarters of the oscilloscope graticule.

i. Vary the sweep generator center frequency control so that the 150 MHz marker is on the right side of the oscilloscope graticule. Set the sweep generator 10 MHz markers on. Vary the sweep generator center frequency and sweep width controls to place the 140 MHz marker (1st marker on left side of 150 MHz marker) on the center graticule line and the 130 MHz and 150 MHz markers so that they are present on each side of the 140 MHz marker.

j. Adjust A1A5C17 and A1A5C23 and spread the turns of A1A5L2 and A1A5L3 to center the response curve on the 140 MHz marker and for the best symmetry.

k. If the response curve is overcoupled (dip in the center), decrease the value of A1A5C20 to obtain the narrowest possible response curve with minimum insertion loss.

l. Disconnect the BNC test cable connector from the detector RF input receptacle and connect the cable to the RF voltmeter.

m. Set the sweep generator to CW and set the output level to 0 dBm.

n. Set the sweep generator center frequency to 130 MHz. The RF voltmeter should indicate −26 dBm maximum.

o. Set the sweep generator center frequency to 150 MHz. The RF voltmeter should indicate −26 dBm maximum.

p. Set the sweep generator center frequency to 140 MHz. The RF voltmeter should indicate −6 dBm minimum (6 dB maximum insertion loss).

q. Disconnect the sweep generator, RF voltmeter and BNC test cables. Resolder the taps to A1A5L2 and A1A5L3, 1/2 turn from ac ground.

r. Connect the oscilloscope 10 X probe to A1A5TP2. The level should be 100 mV p-p. If the level is less than 100 mV p-p, move the taps of A1A5L2 and A1A5L3 up to obtain 100 mV p-p (3/4 turn is the maximum allowed).

s. Disconnect the oscilloscope 10 X probe from A1A5TP2 and connect it to A1A5-7. Adjust A1A5C25 for maximum output level at 140 MHz. The level should be 400 mV p-p. If it is less than 400 mV p-p, move the tap of A1A5L4 up (3/4 turn maximum) and increase the value of A1A5C29 if necessary to obtain 400 mV p-p. If A1A5C29 is too large, the A1A5Q5 stage may oscillate. If oscillation occurs, increase the value of A1A5R17 and decrease the value of A1A5C29 until the oscillation stops.

t. Disconnect the oscilloscope 10 X probe from A1A5-7 and connect it to junction of A1A5C37 and A1A5L6. Tune A1A5C32 for maximum output level at 140 MHz. The output level should be approximately 3.2 V p-p. If it is less than 3.2 V p-p, move A1A5C37 up on A1A5L5 (3/4 turn maximum) and increase the value of A1A5C34, if necessary to obtain 3.2 V p-p. If A1A5C34 is too large, A1A5Q6 stage may oscillate. If oscillation occurs, increase the value of A1A5R22 and decrease the value of A1A5C34 until the oscillation stops.

u. Disconnect the oscilloscope 10 X probe from A1A5-7. Unsolder the coaxial cable center conductor from A1A5-4 and connect the BNC test cable to A1A5-4.

v. Connect the signal generator to the spectrum analyzer RF input receptacle. Set the signal generator frequency to 700 MHz and center the 700 MHz response on the spectrum analyzer.

w. Disconnect the signal generator from the spectrum analyzer and connect the spectrum analyzer RF input receptacle to the BNC test cable installed in Step u.

x. Adjust A2A5C39 and A1A5C45 for maximum output level at 700 MHz on the spectrum analyzer. Move A1A5C41 on A1A5L7 to obtain the maximum possible output level on the spectrum analyzer. Select the value of A1A5C42 to obtain the maximum possible output level on the spectrum analyzer. Move A1A5C44 on A1A5L8 to obtain the maximum possible output level. Readjust A1A5L1, A1A5C17, A1A5C23, A1A5C32, A1A5C39 and A1A5C45 for maximum output level with minimum sidebands. The sidebands are 10 MHz, 20 MHz and 140 MHz out from 700 MHz and should be 35 dB minimum down from the 700 MHz signal.

y. Disconnect the spectrum analyzer from the BNC test cable and connect the RF voltmeter, with 50 ohm termination, to the BNC test cable. The output level shall be +4 dBm minimum. If the output level is less than +4 dBm, select the value of A1A5C42 and move A1A5C41 on A1A5L7 and A1A5C44 on A1A5L8 to obtain +4 dBm minimum.

z. Disconnect the RF voltmeter and BNC test cable from A1A5-4 and resolder the coaxial cable center conductor to A1A5-4. Install the cover on the circuit board.

aa. Disconnect BNC cable of the 700 MHz filter, FL2, from the mixer Z1-L and connect it to the spectrum analyzer RF input receptacle. Adjust the trimmer capacitor on FL2 for maximum output with minimum sidebands at 700 MHz.

ab. Readjust A1A5C32, A1A5C39, A1A5C45 and the trimmer capacitor on FL2 for maximum output with minimum sidebands at 700 MHz. The sidebands are 10 MHz, 20 MHz and 140 MHz out from the 700 MHz and should be 50 dB minimum down from the 700 MHz signal.

ac. Disconnect the spectrum analyzer from the FL2 BNC cable and connect the BNC cable to the RF voltmeter with 50 ohm termination. The output level should be +3 dBm minimum.

ad. If the output level is less than +3 dBm and the sidebands are less than 60 dB down, disconnect the RF voltmeter from the FL2 BNC cable and connect the cable to the detector RF input receptacle. Connect the detector dc output receptacle to the sweep generator demodulator input receptacle. Remove the cover from A1A5 and unsolder the coaxial cable center conductor from A1A5-4. Connect the BNC test cable to the coaxial cable center conductor and shield to ground. Connect the BNC connector of the test cable to the sweep generator RF output receptacle.

ae. Set the sweep generator to sweep between 650 MHz and 750 MHz, output level to 0 dBm and 50 MHz markers on.

af. Connect the sweep generator oscilloscope vertical receptacle to the oscilloscope vertical input receptacle with a 50 ohm coaxial cable.

ag. Connect the sweep generator oscilloscope horizontal receptacle to the oscilloscope horizontal input receptacle with a 50 ohm coaxial cable.

ah. Set the oscilloscope time base to external and vary the horizontal and vertical amplitude controls and switches so that the display deflects approximately three-quarters of the oscilloscope graticule.

ai. Vary the sweep generator center frequency to position the 700 MHz marker on the center line of the oscilloscope graticule and vary the sweep width control to position the 650 MHz and 750 MHz markers on the outside lines of the graticule.

aj. Pull the filter, FL2, away from the filter cover mounted on the side chassis. Adjust the trimmer on FL2 to position the response curve peak exactly on the 700 MHz marker. Decrease the filter insertion loss by moving the input and output cable coupling links (center conductors) equally closer to the resonator while maintaining symmetry of the response curve.

ak. Install the filter into the filter cover and readjust the trimmer on FL2 if necessary to center the response curve on the 700 MHz marker. Disconnect the BNC test cable connector from the sweep generator RF output receptacle and connect it to the signal generator RF output receptacle. Set the signal generator frequency to 700 MHz and set the output level to 0 dBm.

al. Disconnect the FL2 BNC cable from the detector RF receptacle and connect it to the RF voltmeter with 50 ohm termination. The output level shall be −1.5 dBm minimum (1.5 dB maximum insertion loss).

am. Set the signal generator frequency to 690 MHz. The output level should be −5.5 dBm maximum.

an. Set the signal generator frequency to 710 MHz. The output level should be −5.5 dBm maximum.

ao. Set the signal generator frequency to 840 MHz. The output level should be −20 dBm maximum.

ap. Set the signal generator frequency to 560 MHz. The output level should be −20 dBm maximum.

aq. Disconnect the signal generator and the BNC test cable from the coaxial cable center conductor on A1A5. Resolder the coaxial cable center conductor to A1A5-4. Reinstall the cover on A1A5.

ar. Readjust A1A5C32, A1A5C39, A1A5C45 and the trimmer capacitor on FL2 for maximum output. The output level should be +3 dBm mimimum.

as. Disconnect the RF voltmeter from the BNC cable of FL2 and connect the BNC cable to the spectrum analyzer RF input receptacle. Verify that the 10 MHz, 20 MHz and 140 MHz sidebands are 60 dB minimum below the 700 MHz level.

at. Disconnect the BNC cable of FL2 from the spectrum analyzer RF input receptacle and connect it back to Z1-L. Spot solder FL2 into the housing cover.

2.5.5 Broadband Amplifier Alignment (A1A2) (See Figure 2-3)

a. Connect the sweep generator RF output receptacle to the MEASURE INPUT receptacle using a 50 ohm BNC cable.

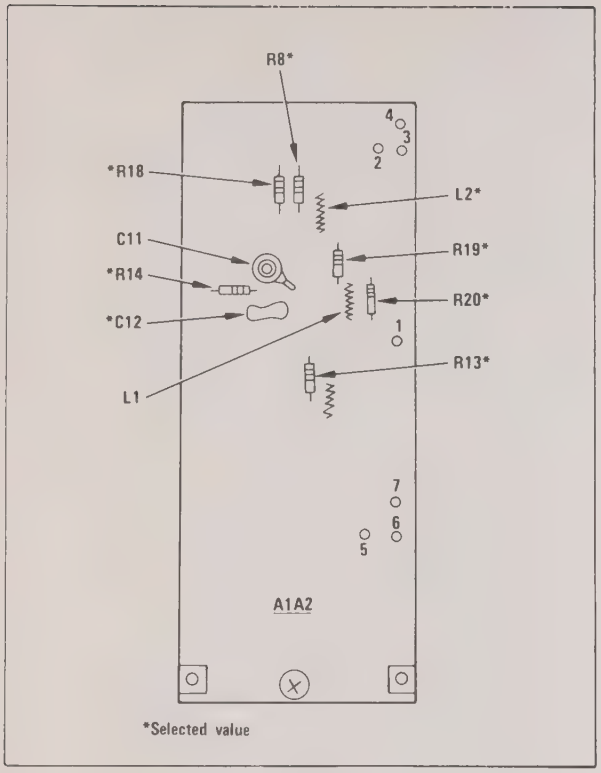


Figure 2-3. Trimmer Locations Broadband Amplifier Assembly, A1A2

b. Disconnect the BNC cable connector at A1A4J3. Connect the detector RF input receptacle to this cable connector. Connect the detector dc output receptacle to the sweep generator demodulator input receptacle.

c. Connect the sweep generator oscilloscope vertical receptacle to the oscilloscope vertical input receptacle using a 50 ohm coaxial cable.

d. Connect the sweep generator oscilloscope horizontal receptacle to the oscilloscope horizontal input receptacle using a 50 ohm coaxial cable.

e. Set the sweep generator center frequency to 250 MHz, sweep width to approximately 520 MHz, 50 MHz marker switch on, and output level to −41 dBm.

f. Set the oscilloscope timebase to external and vary the horizontal and vertical amplitude controls and switches so that the display deflects approximately three-quarters of the oscilloscope graticule.

g. Vary the sweep generator marker amplitude to display the 50 MHz markers. Vary the center frequency if necessary to display all 50 MHz markers between 50 kHz and 500 MHz.

h. Adjust trimmer capacitor A1A2C11 and select A1A2C12 for the flattest possible response curve on the oscilloscope. Readjust as necessary as there is interaction between the two components.

i. Individually short one or more turns of A1A2L2 together using two insulated tuning sticks to obtain the flattest possible response up to 512 MHz. Solder the necessary turns together. Readjust the trimmer capacitors as necessary.

j. Individually select resistors A1A2R8, A1A2R13, and A1A2R20 (across A1A2L1) as necessary to obtain the flattest overall response. Decrease the resistance to decrease the gain.

k. Individually select resistors A1A2R18 and A1A2R19 as necessary to obtain the flattest overall response. Do not decrease the value of A1A2R18 or A1A2R19 to less than 680 ohms as it will affect the bias of transistors A1A2Q2 and A1A2Q4.

l. When the amplifier response is flat to within ±1.5 dB from 50 kHz to 600 MHz, disconnect the detector RF input receptacle from the A1A2 BNC cable and connect the RF voltmeter to this cable.

m. Set the sweep generator to the CW mode, center frequency to 50 kHz, and the output level to −38 dBm.

n. Vary the sweep generator center frequency from 50 kHz to 512 MHz. The output level should be −21 dBm ±1.5 dB.

o. If the output level is not −21 dBm ±1.5 dB, repeat Steps a. thru n. to obtain an output level of −21 dBm ±1.5 dB.

p. Set the sweep generator output level to −18 dBm. Vary the center frequency from 50 kHz to 512 MHz. The output level should be −0.75 dBm ±1.25 dB (−2 dBm to +0.5 dBM).

q. If the output level is not within tolerance the amplifier must be realigned so that it is not in compression with an input level of −18 dBm.

2.5.6 11 MHz and 2 MHz IF Amplifier Alignment (A1A3) (See Figure 2-4)

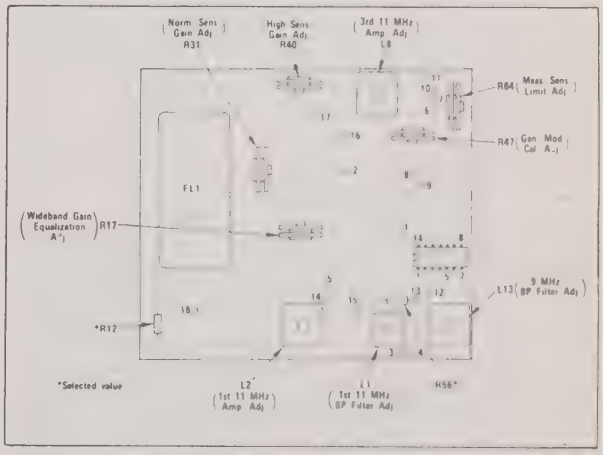

Norm Sens Gain Adj R31
High Sens Gain Adj R40
3rd 11 MHz Amp Adj L8
R64 Meas Sens Limit Adj
R47 Gen Mod Cal Adj
FL1
Wideband Gain Equalization Adj R17
L13 9 MHz BP Filter Adj
*R12
*Selected value
L2 1st 11 MHz Amp Adj
L1 1st 11 MHz BP Filter Adj
R56*

Figure 2-4. Trimmer Locations, 11 MHz IF Assembly, A1A3

a. Connect the coaxial connector, P1, on the back panel of the Model RFM-10E to its mating connector in the Mainframe using adapter cables No. 1 and No. 2 (Refer to Table 2-1.)

b. Set the Model RFM-10E MEASURE MODE BANDWIDTH switch to the IN-NARROW position and verify that the NARROW lamp is lit. Set the Model RFM-10E MEASURE SENSITIVITY switch to the NORMAL position and the MEASURE SENSITIVITY control to the fully cw position (0.064 mV).

c. Set the Mainframe Frequency switches to 151 MHz (or some other frequency above 11 MHz which is not affected by internal spurious signals).

d. Using the ac voltmeter, measure the level of the 9 MHz synthesizer signal at P2-24 on the Model RFM-10E back panel 24 pin connector. This level should be +3 dBm ±2 dB. If necessary select A2C16 in the Mainframe to obtain this level.

e. Remove cable, W1, from the step attenuator and connect W1 to the 50 ohm RF voltmeter probe. Adjust A1A2R31 (ALC) in the Mainframe to obtain a level of 0 dBm. This sets the 162 MHz input from the synthesizer at −33 dBm.

f. Connect the ac voltmeter to the back panel 24 pin connector; center conductor to P2-1, and shield to P2-13.

g. Connect the signal generator to the Model RFM-10E MEAS INPUT receptacle, and set to the frequency of the Mainframe (151 MHz).

h. Set the Model RFM-10E MEASURE SENSITIVITY control to fully ccw (2 mV) and set the MEASURE SENSITIVITY switch to NORMAL.

i. Connect the oscilloscope 10 X probe to the junction of A1A3R2 and A1A3R3. Adjust A1A3L1 for maximum amplitude at 11 MHz. The level should be approximately 30 mV p-p. (Note this level for Step m.)

j. Connect the oscilloscope 10 X probe to the junction of A1A3C5 and A1A3C6. Adjust A1A3L2 for maximum amplitude at 11 MHz. The level should be approximately 120 mV p-p.

k. Set the Model RFM-10E MEASURE MODE BANDWIDTH switch to IN-NARROW. The NARROW lamp should be lit.

l. Connect the oscilloscope 10 X probe to the junction of A1A3CR5 and A1A3CR6. The level should be approximately 95 mV p-p.

m. Set the Model RFM-10E MEASURE MODE BANDWIDTH switch to OUT-WIDE. The NARROW lamp should be extinguished. Adjust A1A3R17 (Wideband Equalization Adj.) to obtain the same level as in Step i. If A1A3R17 has insufficient range, increase the value of A1A3R12.

n. Connect the oscilloscope 10 X probe to the junction of A1A3CR9 and A1A3CR11. Set the Model RFM-10E MEASURE SENSITIVITY switch to HIGH and set A1A3R31, A1A3R40 and A1A3R47 to the mid-range positions. Adjust A1A3L8 for maximum amplitude at 11 MHz.

o. Connect the oscilloscope 10 X probe to A1A3U1-5. Adjust A1A3L13 for maximum amplitude at 9 MHz. The level should be approximately 600 mV p-p.

p. Reconnect the cable disconnected in Step e.

2.5.7 RF Output Leveling

a. Set the Mainframe MODE switch to the GEN position, Frequency switches to 250 MHz, RF OUTPUT switches to 10 dBm.

b. Connect the RF voltmeter with 50 ohm termination to the Model RFM-10E RF OUTPUT receptacle.

c. Adjust the Mainframe A1A2R31 to obtain −10 dBm on the RF voltmeter. Rotate the Mainframe Frequency switches to each position (100 MHz control 0 to 5 only). The RF output level shall be −10 dBm ±1 dB from 50 kHz to 512 MHz.

NOTE

To check the high band RF output, 800 to 1212 MHz, refer to Paragraph 2.4.2.f thru k.

2.5.8 Gen Mod Cal Adjustment

a. Set the Mainframe MODE switch to GEN MOD CAL.

b. Connect the ac voltmeter to the 2 MHz IF output, P2-1 of the 24 pin receptacle on the back panel of the Model RFM-10E (Ground to P2-13).

c. Verify that A1A3R47 (Gen Mod Cal Adj.) is set to its mid-range position.

d. Select the value of A1A4R35 for 4.5 mV rms indication on the ac voltmeter. If exactly 4.5 mV rms cannot be obtained with standard 5% resistor values, select a value that will produce a level as near to 4.5 mV rms as possible and adjust A1A3R47 to obtain exactly 4.5 mV rms.

2.5.9 Measure Input Sensitivity and Calibration

a. Connect the signal generator to the MEASURE INPUT receptacle of the Model RFM-10E. Set the frequency to 151 MHz and the output level to −71 dBm.

b. Connect the RF voltmeter to the junction of A1A6C9 and A1A6C10 (output of the A1A6 assembly).

c. Select the value of A1A6R3 for an indication of −54 dBm on the RF voltmeter (may require only a jumper wire). Remove the RF voltmeter.

d. Set the Model RFM-10E MEASURE SENSITIVITY control to fully cw (0.064 mV) and set the MEASURE SENSITIVITY switch to NORMAL.

e. Adjust A1A3R31 (Normal Sens. Gain Adj.) for exactly 2.7 mV rms on the ac voltmeter (connected as in Paragraph 2.5.7-b.).

f. Set the Model RFM-10E MEASURE SENSITIVITY control to fully ccw (2 mV). Set the 151 MHz signal generator output level to −41 dBm.

g. Adjust A1A3R64 (Meas. Sens. Limit Adj.) for exactly 2.7 mV rms on the ac voltmeter.

h. Repeat Steps d. thru g. to obtain exactly 30 dB of range for the MEASURE SENSITIVITY control.

i. Set the 151 MHz signal generator output level to −71 dBm.

j. Set the Model RFM-10E MEASURE SENSITIVITY switch to HIGH and leave the control set to fully ccw (64 uV).

k. Adjust A1A3R40 (High Sens. Gain Adj.) for exactly 2.7 mV rms on the ac voltmeter.

l. Set the 151 MHz signal generator output level to −101 dBm. Set the Model RFM-10E MEASURE SENSITIVITY vernier to fully cw (2 uV). The ac voltmeter should indicate exactly 2.5 mV rms. If not, repeat Steps d. thru l.

m. Set the Model RFM-10E MEASURE SENSITIVITY control to 4 uV. Vary the 151 MHz signal generator output level for a 2.7 mV rms indication on the ac voltmeter. The signal source output level should be −95 dBm ±3 dB.

n. Repeat Step m. except substitute 8 uV for 4 uV and −89 dBm ±3 dB for −95 dBm ±3 dB.

o. Repeat Step m. except substitute 16 uV ro 4 uV and −83 dBm ±3 dB for −95 dBm ±3 dB.

p. Repeat Step m. except substitute 32 uV for 4 uV and −77 dBm ±3 dB for −95 dBm ±3 dB.

q. Set the Model RFM-10E MEASURE SENSITIVITY switch to NORMAL.

r. Repeat Step m. except substitute 0.125 mV for 4 uV and −65 dBm ±3 dB for −95 dBm ±3 dB.

s. Repeat Step m. except substitute 0.25 mV for 4 uV and −59 dBm ±3 dB for −95 dBm ±3 dB.

t. Repeat Step m. except substitute 0.5 mV for 4 uV and −53 dBm ±3 dB for −95 dBm ±3 dB.

u. Repeat Step m. except substitute 1.0 mV for 4 uV and −47 dBm ±3 dB for −95 dBm ±3 dB.

v. Set the Model RFM-10E MEASURE SENSITIVITY control to fully ccw (2 mV). Set the 151 MHz signal source frequency to 50 kHz.

w. Vary the signal source output level for a 2.7 mV rms indication on the ac voltmeter. The signal source output level should be −41 dBm ±3 dB.

x. Repeat Step w. at 1 MHz, 50 MHz, every 50 MHz up to 500 MHz and at 512 MHz. Disconnect the 151 MHz signal source from the Model RFM-10E.

NOTE

To check the high band Measure Input Sensitivity, 800 to 1212 MHz, refer to Paragraph 2.4.3-f thru j.

2.6 FAULT ISOLATION PROCEDURES

Fault Isolation Procedures are presented to provide a guide in servicing the Model RFM-10E. The procedures follow the sequence of the Minimum Performance Procedures of Paragraph 2.4, with each subsection keyed to the step in Paragraph 2.4 that first indicates a fault. When a fault is noted during the Model RFM-10E operation, proceed as follows:

a. Perform Minimum Performance Procedures in Paragraph 2.4.

b. Start Fault Isolation Procedures at the point where minimum performance cannot be satisfied.

c. When the fault is isolated to a function, such as the 11 MHz amplifier, refer to the alignment procedures for that function in Paragraph 2.5 and check alignment of that function before proceeding with fault isolation.

d. After a fault is repaired, complete the Minimum Performance Procedures to determine if further alignment is necessary.

2.6.1 Output Level Not Within Tolerance (2.4.2-d and 2.4.2-e)

a. Check alignment of broadband amplifier as in Paragraph 2.5.1.

b. Check step attenuator AT1.

c. Check RF Output Leveling as in Paragraph 2.5.7.

d. Check Mainframe as in Mainframe Maintenance Manual.

2.6.2 Measure Mode Sensitivity Not Within Tolerance (2.4.3-e)

a. Check measure input sensitivity alignment as in Paragraph 2.5.9.

b. Check 11 MHz IF alignment as in Paragraph 2.5.6.

c. Check 9 MHz filter alignment as in Paragraph 2.5.6.

d. Check 2 MHz IF alignment as in Paragraph 2.5.6.

e. Check Diode Switch Assembly, A1A6, as in Paragraph 2.5.9-a thru c.

2.6.3 No RF Output (2.4.2-d and 2.4.2-j) (Fuse replacement)

a. If the RF voltmeter indicates no RF voltage, check the RF fuse in the RF OUTPUT receptacle, J1.

b. To remove/replace the fuse, unscrew the BNC connector from the panel mounted housing.

c. Remove the fuse from the connector and test with an ohmmeter. Replace if defective, with one of the supplied fuses (Part No. 1-404131-001).

d. Install the fuse into the BNC connector's center contact.

e. Replace the BNC connector into the panel mounted housing. Be very careful that the fuse does not get broken.

Section III
REPLACEABLE PARTS

3.1 INTRODUCTION

This replaceable parts section includes all pertinent data necessary to locate, identify, and procure additional parts for the equipment. Parts are listed alphanumerically by reference symbol and include all replaceable electronic items. In some cases, values, ratings and manufacturer sources shown are nominal and variations may be found. Satisfactory replacement may be made with either the listed component or an exact replacement of the part(s) removed from the equipment.

3.2 ORDERING INFORMATION

The following instructions will aid in ordering parts from the parts list.

a. Address all inquiries or orders to:

CUSTOMER SERVICE
AILTECH
Div. of Cutler-Hammer
5340 Alla Road
Los Angeles, California 90066

b. Include the following information:

1) Model and Serial Number of Instrument.

2) AILTECH Part Number.

3) Reference Symbol Number.

4) Description (as shown on Parts List).

3.3 PARTS LIST USE

The Table of Contents at the front of the manual lists the Parts Lists tables, related assemblies and location. Table 3-3 lists the manufacturer's code. Table 3-1 is a list of circuit reference symbols. Table 3-2 is a list of abbreviations used with this Parts List. Tables 3-4 through 3-9 lists parts used in the Model RFM-10E. The following paragraphs describe the use and meaning of the five columns included in the Parts Lists starting with Table 3-4.

a. Reference Designation, Column 1

The Reference Designation Column contains an alphanumeric listing of parts as they appear on the equipment chassis, illustration, or schematic. The reference designation identifies the parts as to their component function in the instrument.

b. AILTECH Part Number, Column 2

The AILTECH Part Number column contains the part number as designated by AILTECH.

c. Description, Column 3

The Description column contains the identification of component parts, including all pertinent specifications. When the description column is used for a reference symbol for which no part exists, "NOT USED" is placed in the column. In these instances, columns 2, 4, and 5 are left blank.

d. Manufacturer's Code Number, Column 4

The Manufacturer's Code Number column references the manufacturer by an assigned code number, as listed in Federal Supply Code Handbook H4-2. For manufacturers not listed in the Handbook, a letter code will be assigned. Table 3-3 includes the manufacturer and his code designation.

e. Manufacturer's Part Number, Column 5

The Manufacturer's Part Number shown contains the part number as designated by the manufacturer of the part.

Table 3-1. Reference Symbols

A	Assembly	P	Plug, Connector
AT	Attenuator, Isolator	Q	Transistor
C	Capacitor	R	Resistor
CP	Adaptor	RT	Thermistor
CR	Diode	S	Switch
CD	Directional Coupler	T	Transformer
DS	Lamp	U	Integrated Circuit
F	Fuse	W	Cable
FL	Filter, Ferrite Bead (RF Choke)	XA	PCB Socket
J	Jack, Connector	Y	Crystal, Y16
K	Relay	Z	Miscellaneous Parts:
L	Inductor		Mixer,
LS	Loud Speaker		Modulator, Network
OI	Optical Isolator		Etc.

Table 3-2. Abbreviations

A	Ampere	mW	Milliwatts
ac	Alternating Current	No.	Number
Cer.	Ceramic	NPNT	N pole N Throw (N=Digit) (S=Single)
Comp.	Composition		
dc	Direct Current	Op Amp	Operational Amplifier
Dep. Car.	Deposited Carbon	P	0.000,000,000,001 (10^{-12})
Desig.	Designator	P/O	Part of
DM	Dipped Mica	Pot.	Potentiometer
Elec.	Electrolytic, Aluminum	p^F	Picofarad
F	Farad	RF	Radio Frequency
Fact. Sel.	Factory Selected	Rect.	Rectifier
GP	General Purpose	Ref.	Reference
H	Henry	Spec.	Special
HC	Hot Carrier (Diode)	Tant.	Tantalum, Electrolytic
Hz	Hertz	μ	0.000.001 (10^{-6})
IND-STD	Industry Standard	μF	Microfarads
k	Thousand (10^3)	μH	Microhenry
LED	Light Emitting Diode	V	Volts
m	0.001 (10^{-3})	Var.	Variable
M	Million (10^6)	W	Watts
mA	Milliamperes	WW	Wirewound
MF	Metal Film	OTC	Zero Temperature Coefficient
Mfr	Manufacturer	%	±% if sign not Shown
mH	Millihenry	Ω	Ohms
mV	Millivolts		

Table 3-3. Code List of Manufacturers

The following code number are from the Federal Supply Code for Manufacturers Cataloging Handbook H4-2.

Code No.	Manufacturer	Address
01121	Allen-Bradley Co.	Milwaukee, Wis.
01295	Texas Instruments, Inc. Transistors Products Division	Dallas, Texas
03508	G.E. Semiconductor Products Division	Syracuse, N.Y.
03877	Transitron Electronic Corp.	Wakefield, Mass.
04713	Motorola Inc.	Phoenix, Ariz.
04946	Standard Wire & Cable Co.	Los Angeles, CA.
08730	Vermaline Products Co. Inc.	Wyckoff, N.J.
12954	Dickson Electronics Corp.	Scottsdale, Ariz.
13511	Amphenol Cadre	Los Gatos, Calif.
19197	Solid State Scientific Inc.	Philadelphia, Pa.
21604	Buckeye Stamping Co.	Columbus, Ohio
24759	Lenox-Fugle Electronics, Inc.	So. Plainfield, N.J.
25403	Amperex Electronics Corp.	Slaterville, R.I.
29525	Hytronics Corp.	Pinellas Park, Fla.
32539	Mura Corp.	Great Neck, N.Y.
43543	Nytronics Inc.	Alpha, N.J.
49675	RCA Electronic Products Division	Camden, N.J.
50293	General Electric Co.	Schenectady, N.Y.
56289	Sprague Electric Co.	North Adams, Mass.
71450	CTS Corp.	Elkhart, Ind.
72136	Electro Motive Mfg. Co.	Willimantic, Conn.
72699	General Instrument Corp.	Newark, N.J.
72982	Erie Technological Products Inc.	Erie, Pa.
73445	Amperex Electronics Co.	Hicksville, N.Y.
80795	ITT Semiconductors	New York, N.Y.
82389	Switchcraft Inc.	Chicago, Ill.
88869	AILTECH	Los Angeles, Calif.
91293	Johanson Mfg. Co.	Boonton, N.J.
95121	Quality Components Inc.	St. Marys, Pa.

Table 3-4. Parts List for Main Assemblies and Chassis

Ref. Desig.	AILTECH Part No.	Description	Mfr. Code No.	Mfr. Part No.
A1A1		Not used		
A1A2	1-004840-001	Assembly, Broadband Amplifier	88869	
A1A3	4-004836-001	Assembly, 11 MHz and 2 MHz IF Amplifier	88869	
A1A4	1-004820-001	Assembly, Broadband Amplifier, Mixer Detector	88869	
A1A5	4-004726-001	Assembly, 700 MHz Multiplier	88869	
A1A6	3-005085-001	Assembly, Diode Switch	88869	
A1A7	1-005495-001	Assembly, High-Pass Filter	88869	
AT1	4-403416-001	Attenuator, step, assembly, dual concentric, 0 dB to 110 dB in 1.0 dB and 10 dB steps	88869	
C1		Not used		
C2	1-900039-005	Capacitor, fixed, electrolytic, 50 uF, −10% +75%, 25 V dc	72699	984-1654
C3	1-900003-034	Capacitor, fixed, mica, 150 pF, ±5%, 500 V dc	72136	DM15
CR1	1-913007-001	Diode, silicon, VR=75 V, If=10 mA	03508	1N4148
CR2	1-913007-001	Diode, silicon, Vr=75, If=10 mA	03508	1N4148
DS1	1-925007-003	Indicator lamp assembly, red lens, 10 V, 20 mA	32539	L10/20
F1	1-404131-001	Fuse, 1/8 Amp (spare, 5/box)	88869	
J1		Part of RFF-10		
J2		Part of A1A2W2		
P1		Part of W2		
P2	1-910071-002	Connector, plug, rectangular, 24 pin	13511	26-159-24
R1		Resistor, variable, composition, 1.0 kilohm, ±30%, 1/2 W (Part of S1)		
R2		Resistor, fixed, composition, 1.0 kilohm, ±10%, 1/4 W (Part of S1)		
RFF-10	4-005431-104	Fuse, RF Assembly	88869	
S1/R1/R2	1-004938-001	Switch/variable resistor assembly, (S1) Switch, rotary, 1 pole, 2 position	88869	
S2	1-951024-002	Switch, push-push, 2 pole, 2 position	82389	65017-206
W1	1-005678-001	Cable assembly, 5 in., BNC to BNC	88869	
W2	1-004818-001	Cable assembly, 6-1/2 in., BNC to push-on	88869	
W3	1-004819-001	Cable assembly, 9-1/2 in., phono plug one end	88869	
W4	1-005502-001	Cable assembly, 10 in., BNC to BNC	88869	
W5	1-005503-001	Cable assembly, 4 in., BNC to SMB	88869	
W6	1-005504-001	Cable assembly, 8 in., BNC to SMB	88869	
W7	1-005505-001	Cable assembly, 13 in., BNC one end	88869	
W8	1-005612-001	Cable assembly, 8 in., BNC to rt. angle SMC	88869	
		Supplied Accessory:		
	1-003159-002	Cable assembly (jumper), BNC to BNC	88869	
	1-935003-101	Knob, black (MEASURE SENSITIVITY)	21604	RSS50L-1
	1-935007-002	Knob, black, concentric (HIGH-NORMAL)	21604	SSN70CL-2
	1-964183-001	Pawl, adjustable (2 req.)	08730	SS6121

Table 3-5. Parts List for Broadband Amplifier Assembly, A1A2

Ref. Desig.	AILTECH Part No.	Description	Mfr. Code No.	Mfr. Part No.
C1 (Chassis)	1-900038-001	Capacitor, fixed, feed-thru, 0.001 uF, –0% +100%, 500 V dc	01121	FB2B102W
C1	1-900115-003	Capacitor, fixed, electrolytic, 1.0 uF, ±20%, 50 V dc	12954	DIROGSA50M
C2	1-900115-003	Capacitor, fixed, electrolytic, 1.0 uF, ±20%, 50 V dc	12954	DIROGSA50M
C3	1-900115-002	Capacitor, fixed, electrolytic, 0.1 uF, ±20%, 50 V dc	12954	DR10GSA50M
C4	1-900115-002	Capacitor, fixed, electrolytic, 0.1 uF, ±20%, 50 V dc	12954	DR10GSA50M
C5	1-900115-002	Capacitor, fixed, electrolytic, 0.1 uF, ±20%, 50 V dc	12954	DR10GSA50M
C6	1-900115-003	Capacitor, fixed, electrolytic, 1.0 uF, ±20%, 50 V dc	12954	DIROGSA50M
C7	1-900115-003	Capacitor, fixed electrolytic, 1.0 uF, ±20%, 50 V dc	12954	DIROGSA50M
C8	1-900115-002	Capacitor, fixed, electrolytic, 0.1 uF, ±20%, 50 V dc	12954	DR10GSA50M
C9	1-900115-002	Capacitor, fixed, electrolytic, 0.1 uF, ±20%, 50 V dc	12954	DR10GSA50M
C10		Not used		
C11	1-900113-002	Capacitor, variable, ceramic, 1.7 pF to 11 pF, 500 V dc	91293	9301
C12	1-900003-004	Capacitor, fixed, mica, selected, 5 pF nominal, ±10%, 500 V dc	72136	DM15
C13	1-900115-003	Capacitor, fixed, electrolytic, 1.0 uF, ±20%, 50 V dc	12954	DIROGSA50M
L1	1-906016-049	Inductor, fixed, 1.0 mH, ±10%, 139 mA	24759	DR1000
L2	1-403283-007	Inductor, fixed, selected, 8 turns nominal	88869	
L3	1-906016-049	Inductor, fixed, 1.0 mH, ±10%, 139 mA	24759	DR1000
L4	1-403690-001	Inductor, fixed, selected, 8 turns nominal	88869	
Q1	1-958000-002	Transistor, silicon, PNP	04713	2N3906-5
Q2	1-958064-001	Transistor, silicon, NPN	73445	A486
Q3	1-958000-002	Transistor, silicon, PNP	04713	2N3906-5
Q4	1-958064-001	Transistor, silicon, NPN	73445	A486
R1	1-945000-119	Resistor, fixed, composition, 16 ohm, ±5%, 1/4 W	01121	CB1605
R2		Not used		
R3		Not used		
R4	1-945000-166	Resistor, fixed, composition, 1.5 kilohm, ±5%, 1/4 W	01121	CB1525
R5	1-945000-175	Resistor, fixed, composition, 3.6 kilohm, ±5%, 1/4 W	01121	CB3625

Table 3-5. Parts List for Broadband Amplifier Assembly, A1A2 (Cont.)

Ref. Desig.	AILTECH Part No.	Description	Mfr. Code No.	Mfr. Part No.
R6	1-945000-142	Resistor, fixed, composition, 150 ohm, ±5%, 1/4 W	01121	CB1515
R7	1-945000-176	Resistor, fixed, composition, 3.9 kilohm, ±5%, 1/4 W	01121	CB3925
R8	1-945000-150	Resistor, fixed, composition, selected, 330 ohm nominal, ±5%, 1/4 W	01121	CB3315
R9	1-945000-166	Resistor, fixed, composition, 1.5 kilohm, ±5%, 1/4 W	01121	CB1525
R10	1-945000-183	Resistor, fixed, composition, 7.5 kilohm, ±5%, 1/4 W	01121	CB7525
R11	1-945000-135	Resistor, fixed, composition, 75 ohm, ±5%, 1/4 W	01121	CB7505
R12	1-945000-176	Resistor, fixed, composition, 3.9 kilohm, ±5%, 1/4 W	01121	CB3925
R13	1-945000-144	Resistor, fixed, composition, selected, 180 ohm nominal, ±5%, 1/4 W	01121	CB1815
R14	1-945000-122	Resistor, fixed, composition, selected, 22 ohm nominal, ±5%, 1/4 W	01121	CB2205
R15		Not used		
R16		Not used		
R17		Not used		
R18	1-945000-162	Resistor, fixed, composition, selected, 1.0 kilohm nominal, ±5%, 1/4 W	01121	CB1025
R19	1-945000-162	Resistor, fixed, composition, selected, 1.0 kilohm nominal, ±5%, 1/4 W	01121	CB1025
R20	1-945000-142	Resistor, fixed, composition, selected, 180 ohm nominal, ±5%, 1/4 W	01121	CB1815
W1	1-004888-001	Cable assembly, 10 in., BNC at one end	88869	
W2	1-004889-001	Cable assembly, 12 in., BNC at one end	88869	

Table 3-6. Parts List for 11.0 MHz and 2.0 MHz IF Amplifier Assembly, A1A3

Ref. Desig.	AILTECH Part No.	Description	Mfr. Code No.	Mfr. Part No.
C1	1-900001-001	Capacitor, fixed, plastic, 0.01 uF, ±20%, 250 V dc	73445	C280AE
C2	1-900077-002	Capacitor, fixed, ceramic, 0.01 uF, ±20%, 100 V dc	56289	TG-S10
C3	1-900003-052	Capacitor, fixed, mica, 680 pF, ±5%, 300 V dc	72136	DM15
C4	1-900001-013	Capacitor, fixed, plastic, 0.1 uF, ±20%, 250 V dc	73445	C280AE
C5	1-900003-052	Capacitor, fixed, mica, 680 pF, ±5%, 300 V dc	72136	DM15
C6	1-900072-027	Capacitor, fixed, mica, 270 pF, ±5%, 500 V dc	72136	SCDM10
C7		Not used		
C8	1-900077-002	Capacitor, fixed, ceramic, 0.01 uF, ±20%, 100 V dc	56289	TG-S10
C9	1-900077-002	Capacitor, fixed, ceramic, 0.01 uF, ±20%, 100 V dc	56289	TG-S10
C10	1-900077-002,	Capacitor, fixed, ceramic, 0.01 uF, ±20%, 100 V dc	56289	TG-S10
C11	1-900077-002	Capacitor, fixed, ceramic, 0.01 uF, ±20%, 100 V dc	56289	TG-S10
C12	1-900077-002	Capacitor, fixed, ceramic, 0.01 uF, ±20%, 100 V dc	56289	TG-S10
C13	1-900077-002	Capacitor, fixed, ceramic, 0.01 uF, ±20%, 100 V dc	56289	TG-S10
C14	1-900077-002	Capacitor, fixed, ceramic, 0.01 uF, ±20%, 100 V dc	56289	TG-S10
C15	1-900077-002	Capacitor, fixed, ceramic, 0.01 uF, ±20%, 100 V dc	56289	TG-S10
C16	1-900077-002	Capacitor, fixed, ceramic, 0.01 uF, ±20%, 100 V dc	56289	TG-S10
C17	1-900077-002	Capacitor, fixed, ceramic, 0.01 uF, ±20%, 100 V dc	56289	TG-S10
C18	1-900077-002	Capacitor, fixed, ceramic, 0.01 uF, ±20%, 100 V dc	56289	TG-S10
C19	1-900077-002	Capacitor, fixed, ceramic, 0.01 uF, ±20%, 100 V dc	56289	TG-S10
C20	1-900077-002	Capacitor, fixed, ceramic, 0.01 uF, ±20%, 100 V dc	56289	TG-S10
C21	1-900077-002	Capacitor, fixed, ceramic, 0.01 uF, ±20%, 100 V dc	56289	TG-S10
C22	1-900077-002	Capacitor, fixed, ceramic, 0.01 uF, ±20%, 100 V dc	56289	TG-S10
C23	1-900077-002	Capacitor, fixed, ceramic, 0.01 uF, ±20%, 100 V dc	56289	TG-S10
C24	1-900077-002	Capacitor, fixed, ceramic, 0.01 uF, ±20%, 100 V dc	56289	TG-S10

Table 3-6. Parts List for 11.0 MHz and 2.0 MHz IF Amplifier Assembly, A1A3 (Cont.)

Ref. Desig.	AILTECH Part No.	Description	Mfr. Code No.	Mfr. Part No.
C25	1-900000-001	Capacitor, fixed, plastic, 0.01 uF, ±20%, 250 V dc	73445	C280AE
C26	1-900003-052	Capacitor, fixed, mica, 680 pF, ±5%, 300 V dc	72136	DM15
C27	1-900072-027	Capacitor, fixed, mica, 270 pF, ±5%, 500 V dc	04062	SCDM10
C28	1-900001-001	Capacitor, fixed, plastic, 0.01 uF, ±20%, 250 V dc	73445	C280AE
C29	1-900077-002	Capacitor, fixed, ceramic, 0.01 uF, ±20%, 100 V dc	56289	TG-S10
C30	1-900077-002	Capacitor, fixed, ceramic, 0.01 uF, ±20%, 100 V dc	56289	TG-S10
C31	1-900077-002	Capacitor, fixed, ceramic, 0.01 uF, ±20%, 100 V dc	56289	TG-S10
C32	1-900077-002	Capacitor, fixed, ceramic, 0.01 uF, ±20%, 100 V dc	56289	TG-S10
C33	1-900077-002	Capacitor, fixed, ceramic, 0.01 uF, ±20%, 100 V dc	56289	TG-S10
C34	1-900077-002	Capacitor, fixed, ceramic, 0.01 uF, ±20%, 100 V dc	56289	TG-S10
C35	1-900077-002	Capacitor, fixed, ceramic, 0.01 uF, ±20%, 100 V dc	56289	TG-S10
C36	1-900077-002	Capacitor, fixed, ceramic, 0.01 uF, ±20%, 100 V dc	56289	TG-S10
C37	1-900077-002	Capacitor, fixed, ceramic, 0.01 uF, ±20%, 100 V dc	56289	TG-S10
C38	1-900077-002	Capacitor, fixed, ceramic, 0.01 uF, ±20%, 100 V dc	56289	TG-S10
C39	1-900072-029	Capacitor, fixed, mica, 330 pF, ±5%, 500 V dc	72136	SCDM10
C40	1-900072-020	Capacitor, fixed, mica, 100 pF, ±5%, 500 V dc	72136	SCDM10
C41	1-900003-057	Capacitor, fixed, mica, 1200 pF, ±5%, 100 V dc	72136	DM15
C42	1-900001-013	Capacitor, fixed, plastic, 0.1 uF, ±20%, 250 V dc	73445	C280AE
C43	1-900001-013	Capacitor, fixed, plastic, 0.1 uF, ±20%, 250 V dc	73445	C280AE
C44	1-900001-013	Capacitor, fixed, plastic, 0.1 uF, ±20%, 250 V dc	73445	C280AE
C45	1-900001-013	Capacitor, fixed, plastic, 0.1 uF, ±20%, 250 V dc	73445	C280AE
C46	1-900072-021	Capacitor, fixed, mica, 120 pF, ±5%, 500 V dc	72136	SCDM10
C47	1-900072-021	Capacitor, fixed, mica, 120 pF, ±5%, 500 V dc	72136	SCDM10
C48	1-900077-002	Capacitor, fixed, ceramic, 0.01 uF, ±20%, 100 V dc	56289	TG-S10

Table 3-6. Parts List for 11.0 MHz and 2.0 MHz IF Amplifier Assembly, A1A3 (Cont.)

Ref. Desig.	AILTECH Part No.	Description	Mfr. Code No.	Mfr. Part No.
C49	1-900003-056	Capacitor, fixed, mica, 1000 pF, ±5%, 100 V dc	72136	DM15
C50	1-900001-013	Capacitor, fixed, plastic, 0.1 uF, ±20%, 250 V dc	73445	C280AE
C51	1-900077-002	Capacitor, fixed, ceramic, 0.01 uF, ±20%, 100 V dc	56289	TG-S10
CR1	1-913005-001	Diode, germanium, Vr=30 V, If=100 mA	03877	1N273
CR2	1-913005-001	Diode, germanium, Vr=30 V, If=100 mA	03877	1N273
CR3	1-913074-001	Diode, silicon, Vr=20 V, If=100 mA	80795	ITT244
CR4	1-913074-001	Diode, silicon, Vr=20 V, If=100 mA	80795	ITT244
CR5	1-913074-001	Diode, silicon, Vr=20 V, If=100 mA	80795	ITT244
CR6	1-913074-001	Diode, silicon, Vr=20 V, If=100 mA	80795	ITT244
CR7	1-913074-001	Diode, silicon, Vr=20 V, If=100 mA	80795	ITT244
CR8	1-913074-001	Diode, silicon, Vr=20 V, If=100 mA	80795	ITT244
CR9	1-913074-001	Diode, silicon, Vr=20 V, If=100 mA	80795	ITT244
CR10	1-913005-001	Diode, germanium, Vr=30 V, If=100 mA	03877	1N273
CR11	1-913074-001	Diode, silicon, Vr=20 V, If=100 mA	80795	ITT244
CR12	1-913074-001	Diode, silicon, VR=20 V, If=100 mA	80795	ITT244
CR13	1-913074-001	Diode, silicon, Vr=20 V, If=100 mA	80795	ITT244
CR14	1-913005-001	Diode, germanium, Vr=30 V, If=100 mA	03877	1N273
FL1	1-403279-001	Filter, crystal, bandpass, Center freq.: 11 MHz ±1 kHz, BW_6=90 kHz	88869	
L1	1-403586-001	Inductor, variable, 0.3 uH to 0.5 uH	88869	
L2	1-906006-006	Inductor, variable, 1.3 uH to 1.8 uH	88869	
L3	1-906038-001	Inductor, fixed, 330 uH, ±10%, 75 mA	29525	C1017-47
L4	1-906038-001	Inductor, fixed, 330 uH, ±10%, 75 mA	29525	C1017-47
L5	1-906038-001	Inductor, fixed, 330 uH, ±10%, 75 mA	29525	C1017-47
L6	1-906038-001	Inductor, fixed, 330 uH, ±10%, 75 mA	29525	C1017-47

Table 3-6. Parts List for 11.0 MHz and 2.0 MHz IF Amplifier Assembly, A1A3 (Cont.)

Ref. Desig.	AILTECH Part No.	Description	Mfr. Code No.	Mfr. Part No.
L7	1-906038-001	Inductor, fixed, 330 uH, ±10%, 75 mA	29525	C1017-47
L8	1-906006-006	Inductor, variable, 1.3 uH to 1.8 uH	88869	
L9	1-906038-001	Inductor, fixed, 330 uH, ±10%, 75 mA	29525	C1017-47
L10	1-906038-001	Inductor, fixed, 330 uH, ±10%, 75 mA	29525	C1017-47
L11	1-906038-001	Inductor, fixed, 330 uH, ±10%, 75 mA	29525	C1017-47
L12	1-906038-001	Inductor, fixed, 330 uH, ±10%, 75 mA	29525	C1017-47
L13	1-906006-006	Inductor, variable, 1.3 uH to 1.8 uH	88869	
L14	1-906022-009	Inductor, fixed, 85 uH, ±5%, 140 mA	29525	13-85-5
Q1	1-958018-001	Transistor, silicon, NPN	49675	2N5179
Q2	1-958018-001	Transistor, silicon, NPN	49675	2N5179
Q3	1-958018-001	Transistor, silicon, NPN	49675	2N5179
Q4	1-958018-001	Transistor, silicon, NPN	49675	2N5179
Q5	1-958018-001	Transistor, silicon, NPN	49675	2N5179
Q6	1-958018-001	Transistor, silicon, NPN	49675	2N5179
Q7	1-958018-001	Transistor, silicon, NPN	49675	2N5179
Q8	1-958018-001	Transistor, silicon, NPN	49675	2N5179
Q9	1-958000-001	Transistor, silicon, NPN	04713	2N3904-5
R1	1-945000-025	Resistor, fixed, composition, 100 ohm, ±10%, 1/4 W	01121	CB1011
R2	1-945000-041	Resistor, fixed, composition, 2.2 kilohm, ±10%, 1/4 W	01121	CB2221
R3	1-945000-019	Resistor, fixed, composition, 33 ohm, ±10%, 1/4 W	01121	CB3301
R4	1-945000-033	Resistor, fixed, composition, 470 ohm, ±10%, 1/4 W	01121	CB4711
R5	1-945000-030	Resistor, fixed, composition, 270 ohm, ±10%, 1/4 W	01121	CB2711
R6	1-945000-037	Resistor, fixed, composition, 1.0 kilohm, ±10%, 1/4 W	01121	CB1021
R7	1-945000-046	Resistor, fixed, composition, 5.6 kilohm, ±10%, 1/4 W	01121	CB5621
R8	1-945000-019	Resistor, fixed, composition, 33 ohm, ±10%, 1/4 W	01121	CB3301
R9	1-945000-042	Resistor, fixed, composition, 2.7 kilohm, ±10%, 1/4 W	01121	CB2721
R10	1-945000-025	Resistor, fixed, composition, 100 ohm, ±10%, 1/4 W	01121	CB1011
R11	1-945000-153	Resistor, fixed, composition, 430 ohm, ±5%, 1/4 W	01121	CB4315

Table 3-6. Parts List for 11.0 MHz and 2.0 MHz IF Amplifier Assembly, A1A3 (Cont.)

Ref. Desig.	AILTECH Part No.	Description	Mfr. Code No.	Mfr. Part No.
R12	1-945000-028	Resistor, fixed, composition, selected, 180 ohm nominal, ±10%, 1/4 W	01121	CB1811
R13	1-945000-025	Resistor, fixed, composition, 100 ohm, ±10%, 1/4 W	01121	CB1011
R14	1-945000-045	Resistor, fixed, composition, 4.7 kilohm, ±10%, 1/4 W	01121	CB4721
R15	1-945000-019	Resistor, fixed, composition, 33 ohm, ±10%, 1/4 W	01121	CB3301
R16	1-945000-042	Resistor, fixed, composition, 2.7 kilohm, ±10%, 1/4 W	01121	CB2721
R17	1-945007-003	Resistor, variable, composition, 500 ohm, ±30%, 1/5 W	71450	X201
R18	1-945000-025	Resistor, fixed, composition, 100 ohm, ±10%, 1/4 W	01121	CB1011
R19	1-945000-057	Resistor, fixed, composition, 47 kilohm, ±10%, 1/4 W	01121	CB4731
R20	1-945000-057	Resistor, fixed, composition, 47 kilohm, ±10%, 1/4 W	01121	CB4731
R21	1-945000-046	Resistor, fixed, composition, 5.6 kilohm, ±10%, 1/4 W	01121	CB5621
R22	1-945000-019	Resistor, vixed, composition, 33 ohm, ±10%, 1/4 W	01121	CB3301
R23	1-945000-033	Resistor, fixed, composition, 470 ohm, ±10%, 1/4 W	01121	CB4711
R24	1-945000-041	Resistor, fixed, composition, 2.2 kilohm, ±10%, 1/4 W	01121	CB2221
R25	1-945000-034	Resistor, fixed, composition, 560 ohm, ±10%, 1/4 W	01121	CB5611
R26	1-945000-034	Resistor, fixed, composition, 560 ohm, ±10%, 1/4 W	01121	CB5611
R27	1-945000-033	Resistor, fixed, composition, 470 ohm, ±10%, 1/4 W	01121	CB4711
R28	1-945000-019	Resistor, fixed, composition, 33 ohm, ±10%, 1/4 W	01121	CB3301
R29	1-945000-033	Resistor, fixed, composition, 470 ohm, ±10%, 1/4 W	01121	CB4711
R30	1-945000-025	Resistor, fixed, composition, 100 ohm, ±10%, 1/4 W	01121	CB1011
R31	1-945007-003	Resistor, variable, composition, 500 ohm, ±30%, 1/5 W	71450	X201
R32	1-945000-035	Resistor, fixed, composition, 680 ohm, ±10%, 1/4 W	01121	CB6811
R33	1-945000-032	Resistor, fixed, composition, 390 ohm, ±10%, 1/4 W	01121	CB3911
R34	1-945000-057	Resistor, fixed, composition, 47 kilohm, ±10%, 1/4 W	01121	CB4731
R35	1-945000-050	Resistor, fixed, composition, 12 kilohm, ±10%, 1/4 W	01121	CB1231

Table 3-6. Parts List for 11.0 MHz and 2.0 MHz IF Amplifier Assembly, A1A3 (Cont.)

Ref. Desig.	AILTECH Part No.	Description	Mfr. Code No.	Mfr. Part No.
R36	1-945000-019	Resistor, fixed, composition, 33 ohm, ±10%, 1/4 W	01121	CB3301
R37	1-945000-045	Resistor, fixed, composition, 4.7 kilohm, ±10%, 1/4 W	01121	CB4721
R38	1-945000-035	Resistor, fixed, composition, 680 ohm, ±10%, 1/4 W	01121	CB6811
R39	1-945000-025	Resistor, fixed, composition, 100 ohm, ±10%, 1/4 W	01121	CB1011
R40	1-945007-003	Resistor, variable, composition, 500 ohm, ±30%, 1/5 W	71450	X201
R41	1-945000-057	Resistor, fixed, composition, 47 kilohm, ±10%, 1/4 W	01121	CB4731
R42	1-945000-035	Resistor, fixed, composition, 680 ohm, ±10%, 1/4 W	01121	CB6811
R43	1-945000-035	Resistor, fixed, composition, 680 ohm, ±10%, 1/4 W	01121	CB6811
R44	1-945000-019	Resistor, fixed, composition, 33 ohm, ±10%, 1/4 W	01121	CB3301
R45	1-945000-032	Resistor, fixed, composition, 390 ohm, ±10%, 1/4 W	01121	CB3911
R46	1-945000-025	Resistor, fixed, composition, 100 ohm, ±10%, 1/4 W	01121	CB1011
R47	1-945007-002	Resistor, variable, composition, 250 ohm, ±30%, 1/5 W	71450	X201
R48	1-945000-057	Resistor, fixed, composition, 47 kilohm, ±10%, 1/4 W	01121	CB4731
R49	1-945000-037	Resistor, fixed, composition, 1.0 kilohm, ±10%, 1/4 W	01121	CB1021
R50	1-945000-057	Resistor, fixed, composition, 47 kilohm, ±10%, 1/4 W	01121	CB4731
R51	1-945000-019	Resistor, fixed, composition, 33 ohm, ±10%, 1/4 W	01121	CB3301
R52	1-945000-053	Resistor, fixed, composition, 22 kilohm, ±10%, 1/4 W	01121	CB2231
R53	1-945000-049	Resistor, fixed, composition, 10 kilohm, ±10%, 1/4 W	01121	CB1031
R54	1-945000-025	Resistor, fixed, composition, 100 ohm, ±10%, 1/4 W	01121	CB1011
R55	1-945000-033	Resistor, fixed, composition, 470 ohm, ±10%, 1/4 W	01121	CB4711
R56	1-945000-033	Resistor, fixed, composition, selected, 470 ohm nominal, ±10%, 1/4 W	01121	CB4711
R57	1-945000-049	Resistor, fixed, composition, 10 kilohm, ±10%, 1/4 W	01121	CB1031
R58	1-945000-047	Resistor, fixed, composition, 6.8 kilohm, ±10%, 1/4 W	01121	CB6821
R59	1-945000-019	Resistor, fixed, composition, 33 ohm, ±10%, 1/4 W	01121	CB3301

Table 3-6. Parts List for 11.0 MHz and 2.0 MHz IF Amplifier Assembly, A1A3 (Cont.)

Ref. Desig.	AILTECH Part No.	Description	Mfr. Code No.	Mfr. Part No.
R60	1-945000-049	Resistor, fixed, composition, 10 kilohm, ±10%, 1/4 W	01121	CB1031
R61	1-945000-042	Resistor, fixed, composition, 2.7 kilohm, ±10%, 1/4 W	01121	CB2721
R62	1-945000-025	Resistor, fixed, composition, 100 ohm, ±10%, 1/4 W	01121	CB1011
R63	1-945000-027	Resistor, fixed, composition, 150 ohm, ±10%, 1/4 W	01121	CB1511
U1	1-926007-026	Integrated circuit, balanced mixer	01295	SN76514N

Table 3-7. Parts List for Broadband Amplifier and Doubly Balanced Mixer Assembly, A1A4

Ref. Desig.	AILTECH Part No.	Description	Mfr. Code No.	Mfr. Part No.
C1 (Chassis)	1-900038-001	Capacitor, fixed, feed-thru 0.001 uF, –0% +100%, 500 V dc	01121	FB2B102W
C2 (Chassis)	1-900038-001	Capacitor, fixed, feed-thru, 0.001 uF, 0% +100%, 500 V dc	01121	FB2B102W
C3 (Chassis)	1-900038-001	Capacitor, fixed, feed-thru, 0.001 uF, –0% +100%, 500 V dc	01121	FB2B102W
C4 (Chassis)	1-900038-001	Capacitor, fixed, feed-thru, 0.001 uF, –0% +100%, 500 V dc	01121	FB2B102W
FL1 (Chassis)	1-919011-004	Filter, feed-thru, 3000 pF min., 500 V dc	72982	1202-052
C1	1-900115-003	Capacitor, fixed, electrolytic, 1.0 uF, ±20%, 50 V dc	12954	DIROGSA50M
C2	1-900115-003	Capacitor, fixed, electrolytic, 1.0 uF, ±20%, 50 V dc	12954	DIROGSA50M
C3	1-900115-002	Capacitor, fixed, electrolytic, 0.1 uF, ±20%, 50 V dc	12954	DRIOGSA50M
C4	1-900115-003	Capacitor, fexed, electrolytic, 1.0 uF, ±20%, 50 V dc	12954	DIROGSA50M
C5	1-900115-002	Capacitor, fixed, electrolytic, 0.1 uF, ±20%, 50 V dc	12954	DRIOGSA50M
C6	1-900115-003	Capacitor, fixed, electrolytic, 1.0 uF, ±20%, 50 V dc	12954	DIROGSA50M
C7	1-900115-003	Capacitor, fixed, electrolytic, 1.0 uF, ±20%, 50 V dc	12954	DIROGSA50M
C8	1-900115-003	Capacitor, fixed, electrolytic, 1.0 uF, ±20%, 50 V dc	12954	DIROGSA50M
C9	1-900115-002	Capacitor, fixed, electrolytic, 0.1 uF, ±20%, 50 V dc	12954	DRIOGSA50M
C10	1-900113-002	Capacitor, variable, ceramic, selected, 1.7 pF to 10 pF, 500 V dc (may be omitted)	91293	9301
C11	1-900113-002	Capacitor, variable, ceramic, 1.7 pF to 10 pF, 500 V dc	91293	9301
C12	1-900003-004	Capacitor, fixed, mica, selected, 5 pF nominal, ±5%, 500 V dc	72136	DM15
C13	1-900115-003	Capacitor, fixed, electrolytic, 1.0 uF, ±20%, 50 V dc	12954	DIROGSA50M
C14	1-900115-002	Capacitor, fixed, electrolytic, 0.1 uF, ±20%, 50 V dc	12954	DRIOGSA50M
C15	1-900115-002	Capacitor, fixed, electroytic, 0.1 uF, ±20%, 50 V dc	12954	DRIOGSA50M
C16	1-900115-002	Capacitor, fixed, electrolytic, 0.1 uF, ±20%, 50 V dc	12954	DRIOGSA50M
C17	1-900115-003	Capacitor, fixed, electrolytic, 1.0 uF, ±20%, 50 V dc	12954	DIROGSA50M
C18	1-900115-003	Capacitor, fixed, electrolytic, 1.0 uF, ±20%, 50 V dc	12954	DIROGSA50M
C19	1-900115-002	Capacitor, fixed, electrolytic, 0.1 uF, ±20%, 50 V dc	12954	DRIOGSA50M

Table 3-7. Parts List for Broadband Amplifier and Doubly Balanced Mixer Assembly, A1A4 (Cont.)

Ref. Desig.	AILTECH Part No.	Description	Mfr. Code No.	Mfr. Part No.
C20	1-900115-002	Capacitor, fixed, electrolytic, 0.1 uF, ±20%, 50 V dc	12954	DRIOGSA50M
C21	1-900115-002	Capacitor, fixed, electrolytic, 0.1 uF, ±20%, 50 V dc	12954	DRIOGSA50M
C22	1-900113-002	Capacitor, variable, ceramic, 1.7 pF to 10 pF, 500 V dc	91293	9301
C23	1-900003-010	Capacitor, fixed, mica, selected, 15 pF nominal, ±5%, 500 V dc	72136	DM15
C24	1-900113-002	Capacitor, variable, ceramic, 1.7 pF to 10 pF, 500 V dc	91293	9301
C25	1-900115-003	Capacitor, fixed, electrolytic, 1.0 uF, ±20%, 50 V dc	12954	DIROGSA50M
C26	1-900066-016	Capacitor, fixed, ceramic, selected, 0.5 pF nominal, ±10%, 500 V dc (may be omitted)	95121	MC
C27	1-900001-009	Capacitor, fired, plastic, 0.047 uF, ±20%, 250 V dc	73445	C280AE
C28	1-900003-003	Capacitor, fixed, mica, selected, 3 pF nominal, ±0.5 pF, 500 V dc (may be omitted)	92136	DM15
C29	1-900115-003	Capacitor, fixed, electrolytic, 1.0 uF, ±20%, 50 V dc	12954	DIROGSA50M
C30	1-900115-002	Capacitor, fixed, electrolytic, 0.1 uF, ±20%, 50 V dc	12954	DRIOGSA50M
C31	1-900115-003	Capacitor, fixed, electrolytic, 1.0 uF, ±20%, 50 V dc	12954	DIROGSA50M
C32	1-900003-010	Capacitor, fixed, mica, selected, 15 pF nominal, ±5%, 500 V dc	72136	DM15
C33	1-900115-002	Capacitor, fixed, electrolytic, 0.1 uF, ±20%, 50 V dc	12954	DRIOGSA50M
C34	1-900003-008	Capacitor, fixed, mica, selected, 10 pF nominal, ±5%, 500 V dc	72136	DM15
C35	1-900115-003	Capacitor, fixed, electrolytic, selected, 1.0 uF nominal, ±20%, 50 V dc	12954	DIROGSA50M
C36	1-900115-002	Capacitor, fixed, electrolytic, 0.1 uF, ±20%, 50 V dc	12954	DRIOGSA50M
C37	1-900003-001	Capacitor, fixed, mica, 1.0 pF, ±0.5 pF, 500 V dc	72136	DM15
C38	1-900115-003	Capacitor, fixed, electrolytic, 1.0 uF, ±20%, 50 V dc	12954	DIROGSA50M
C39	1-900115-003	Capacitor, fixed, electrolytic, 1.0 uF, ±20%, 50 V dc	12954	DIROGSA50M
CR1	1-913026-003	Diode, silicon, Vr=400 mV, If=2 mA	03508	BD-3
CR2	1-913074-001	Diode, silicon, Vr=20 V, If=100 mA	80795	ITT244
CR3	1-913074-001	Diode, silicon, Vr=20 V, If=100 mA	80795	ITT244
CR4	1-913007-001	Diode, silicon, Vr=75 V, If=10 mA	03508	1N4148

Table 3-7. Parts List for Broadband Amplifier and Doubly Balanced Mixer Assembly, A1A4 (Cont.)

Ref. Desig.	AILTECH Part No.	Description	Mfr. Code No.	Mfr. Part No.
CR5	1-913007-001	Diode, silicon, Vr=75 V, If=10 mA	03508	1N4148
CR6	1-913005-001	Diode, germanium, Vr=30 V, If=100 mA	03877	1N273
L1	1-906016-049	Inductor, fixed, 1000 uH, ±10%, 139 mA	24759	DR1000
L2	1-403690-001	Inductor, fixed, selected, 8 turns nominal	88869	
L3	1-906016-049	Inductor, fixed, 1000 uH, ±10%, 139 mA	24759	DR1000
L4	1-403283-001	Inductor, fixed, selected, 4 turns nominal	88869	
L5		Not used		
L6	1-903283-007	Inductor, fixed, selected, 8 turns nominal	88869	
L7	1-906032-045	Inductor, fixed, 470 uH, ±5%, 180 mA	43543	WEE470
L8	1-403283-001	Inductor, fixed, selected, 4 turns nominal	88869	
L9	1-403283-001	Inductor, fixed, selected, 4 turns nominal	88869	
L10	1-906016-049	Inductor, fixed, 1000 uH, ±10%, 139 mA	24759	DR1000
Q1	1-958000-002	Transistor, silicon, PNP	04713	2N3906-5
Q2	1-958064-001	Transistor, silicon, NPN	73445	A486
Q3	1-958000-002	Transistor, silicon, PNP	04713	2N3906-5
Q4	1-958064-011	Transistor, silicon, NPN	73445	A486
Q5	1-958000-002	Transistor, silicon, PNP	04713	2N3906-5
Q6	1-958099-001	Transistor, silicon, NPN	25403	BFR91
Q7	1-958000-002	Transistor, silicon, PNP	04713	2N3906-5
Q8	1-958080-001	Transistor, silicon, NPN	04713	2N4427
Q9	1-958081-001	Transistor, silicon, NPN	19197	SD1005-1
Q10	1-958000-002	Transistor, silicon, PNP	04713	2N3906-5
R1	1-945000-170	Resistor, fixed, composition, 2.2 kilohm, ±5%, 1/4 W	01121	CB2225
R2	1-945000-183	Resistor, fixed, composition, 7.5 kilohm, ±5%, 1/4 W	01121	CB7525
R3	1-945000-142	Resistor, fixed, composition, 150 ohm, ±5%, 1/4 W	01121	CB1515
R4	1-945000-176	Resistor, fixed, composition, 3.9 kilohm, ±5%, 1/4 W	01121	CB3925
R5	1-945000-146	Resistor, fixed, composition, selected, 220 ohm nominal, ±5%, 1/4 W	01121	CB2215
R6	1-945000-119	Resistor, fixed, composition, 16 ohm, ±5%, 1/4 W	01121	CB1605

Table 3-7. Parts List for Broadband Amplifier and Doubly Balanced Mixer Assembly, A1A4 (Cont.)

Ref. Desig.	AILTECH Part No.	Description	Mfr. Code No.	Mfr. Part No.
R7		Not used		
R8		Not used		
R9	1-945000-170	Resistor, fixed, composition, 2.2 kilohm, ±5%, 1/4 W	01121	CB2225
R10	1-945000-183	Resistor, fixed, composition, 7.5 kilohm, ±5%, 1/4 W	01121	CB7525
R11	1-945000-142	Resistor, fixed, composition, 150 ohm, ±5%, 1/4 W	01121	CB1515
R12	1-945000-176	Resistor, fixed, composition, 3.9 kilohm, ±5%, 1/4 W	01121	CB3925
R13	1-945000-148	Resistor, fixed, composition, selected, 270 ohm nominal, ±5%, 1/4 W	01121	CB2715
R14	1-945000-122	Resistor, fixed, composition, 22 ohm, ±5%, 1/4 W	01121	CB2205
R15	1-945000-178	Resistor, fixed, composition, 4.7 kilohm, ±5%, 1/4 W	01121	CB4725
R16	1-945000-188	Resistor, fixed, composition, 12 kilohm, ±5%, 1/4 W	01121	CB1235
R17	1-945000-132	Resistor, fixed, composition, 56 ohm, ±5%, 1/4 W	01121	CB5605
R18	1-945000-168	Resistor, fixed, composition, 1.8 kilohm, ±5%, 1/4 W	01121	CB1825
R19	1-945000-148	Resistor, fixed, composition, selected, 270 ohm nominal, ±5%, 1/4 W	01121	CB2715
R20	1-945000-138	Resistor, fixed, composition, selected, 100 ohm nominal, ±5%, 1/4 W	01121	CB1015
R21	1-945000-165	Resistor, fixed, composition, 1.3 kilohm, ±5%, 1/4 W	01121	CB1325
R22	1-945000-174	Resistor, fixed, composition, 3.3 kilohm, ±5%, 1/4 W	01121	CB3325
R23	1-945000-124	Resistor, fixed, composition, 27 ohm, ±5%, 1/4 W	01121	CB2705
R24	1-945000-176	Resistor, fixed, composition, 3.9 kilohm, ±5%, 1/4 W	01121	CB3925
R25	1-945000-142	Resistor, fixed, composition, selected, 150 ohm nominal, ±5%, 1/4 W	01121	CB1515
R26	1-945000-162	Resistor, fixed, composition, selected, 1.0 kilohm nominal, ±5%, 1/4 W	01121	CB1025
R27	1-945000-117	Resistor, fixed, composition, 13 ohms, ±5%, 1/4 W	01121	CB1305
R28	1-945000-138	Resistor, fixed, composition, 100 ohm, ±5%, 1/4 W	01121	CB1015
R29	1-945000-178	Resistor, fixed, composition, 4.7 kilohm, ±5%, 1/4 W	01121	CB4725
R30	1-945000-156	Resistor, fixed, composition, 560 ohm, ±5%, 1/4 W	01121	CB5615
R31	1-945000-134	Resistor, fixed, composition, selected, 68 ohm nominal, ±5%, 1/4 W	01121	CB6805

Table 3-7. Parts List for Broadband Amplifier and Doubly Balanced Mixer Assembly, A1A4 (Cont.)

Ref. Desig.	AILTECH Part No.	Description	Mfr. Code No.	Mfr. Part No.
R32	1-945016-068	Resistor, fixed, film, 49.9 ohm, ±1%, 1/4 W	72982	RN60D4990F
R33	1-945000-131	Resistor, fixed, composition, 51 ohm, ±5%, 1/4 W	01121	CB5105
R34	1-945000-132	Resistor, fixed, composition, 56 ohm, ±5%, 1/4 W	01121	CB5605
R35	1-945000-158	Resistor, fixed, composition, selected, 680 ohm nominal, ±5%, 1/4 W	01121	CB6815
R36	1-945000-153	Resistor, fixed, composition, 430 ohm, ±5%, 1/4 W	01121	CB4315
R37	1-945000-162	Resistor, fixed, composition, 1.0 kilohm, ±5%, 1/4 W	01121	CB1025
R38	1-945000-153	Resistor, fixed, composition, 430 ohm, ±5%, 1/4 W	01121	CB4315
R39	1-945000-154	Resistor, fixed, composition, 470 ohm, ±5%, 1/4 W	01121	CB4715
R40	1-945000-114	Resistor fixed, composition, 10 ohm, ±5%, 1/4 W	01121	CB1005
R41	1-94500-171	Resistor, fixed, composition, 2.4 kilohm, ±5%, 1/4 W	01121	CB2425
R42	1-945000-139	Resistor, fixed, composition, selected, 110 ohm nominal, ±5%, 1/4 W	01121	CB1115
R43	1-945000-130	Resistor, fixed, composition, 47 ohm, ±5%, 1/4 W	01121	CB4705
R44	1-945000-162	Resistor, fixed, composition, 1.0 kilohm, ±5%, 1/4 W	01121	CB1025
R45	1-945000-184	Resistor, fixed, composition, 8.2 kilohm, ±5%, 1/4 W	01121	CB8225
R46	1-945000-178	Resistor, fixed, composition, 4.7 kilohm, ±5%, 1/4 W	01121	CB4725
R47		Not used		
R48		Not used		
R49		Not used		
Z1	1-403411-001	Mixer, doubly balanced	88869	

Table 3-8. Parts List for 700 MHz Multiplier Assembly, A1A5

Ref. Desig.	AILTECH Part No.	Description	Mfr. Code No.	Mfr. Part No.
C1	1-900001-001	Capacitor, fixed, plastic, 0.01 uF, ±20%, 250 V dc	73445	C280AE
C2	1-900001-001	Capacitor, fixed, plastic, 0.01 uF, ±20%, 250 V dc	73445	C280AE
C3	1-900001-013	Capacitor, fixed, plastic, 0.1 uF, ±20%, 250 V dc	73445	C280AE
C4	1-900001-001	Capacitor, fixed, plastic, 0.01 uF, ±20%, 250 V dc	73445	C280AE
C5	1-900003-042	Capacitor, fixed, mica, 300 pF, ±5%, 500 V dc	72136	DM15
C6	1-900001-001	Capacitor, fixed, plastic, 0.01 uF, ±20%, 250 V dc	73445	C280AE
C7	1-900001-001	Capacitor, fixed, plastic, 0.01 uF, ±20%, 250 V dc	73445	C280AE
C8	1-900001-013	Capacitor, fixed, plastic, 0.1 uF, ±20%, 250 V dc	73445	C280AE
C9	1-900001-013	Capacitor, fixed, plastic, 0.1 uF, ±20%, 250 V dc	73445	C280AE
C10	1-900001-013	Capacitor, fixed, plastic, 0.1 uF, ±20%, 250 V dc	73445	C280AE
C11	1-900001-013	Capacitor, fixed, plastic, 0.1 uF, ±20%, 250 V dc	73445	C280AE
C12	1-900001-001	Capacitor, fixed, plastic, 0.01 uF, ±20%, 250 V dc	73445	C280AE
C13	1-900001-001	Capacitor, fixed, plastic, 0.01 uF, ±20%, 250 V dc	73445	C280AE
C14	1-900003-054	Capacitor, fixed, mica, 820 pF, ±5%, 300 V dc	72136	DM15
C15	1-900003-042	Capacitor, fixed, mica, 300 pF, ±5%, 500 V dc	72136	DM15
C16	1-900113-037	Capacitor, fixed, mica, selected, 200 pF nominal, ±5%, 500 V dc	72136	DM15
C17	1-900113-002	Capacitor, variable, ceramic, 1.7 pF to 11 pF, 500 V dc	91293	9301
C18	1-900001-013	Capacitor, fixed, plastic, 0.1 uF, ±20%, 250 V dc	73445	C280AE
C19	1-900003-010	Capacitor, fixed, mica, 15 pF, ±5%, 500 V dc	72136	DM15
C20	1-900066-019	Capacitor, fixed, ceramic, selected, 0.68 pF nominal, ±10%, 500 V dc	95121	MC
C21	1-900003-012	Capacitor, fixed, mica, 20 pF, ±5%, 500 V dc	72136	DM15
C22	1-900003-012	Capacitor, fixed, mica, 20 pF, ±5%, 500 V dc	72136	DM15
C23	1-900113-002	Capacitor, variable, ceramic, 1.7 pF to 11 pF, 500 V dc	91293	9301

Table 3-8. Parts List for 700 MHz Multiplier Assembly, A1A5 (Cont.)

Ref. Desig.	AILTECH Part No.	Description	Mfr. Code No.	Mfr. Part No.
C24	1-900001-001	Capacitor, fixed, plastic, 0.01 uF, ±20%, 250 V dc	73445	C280AE
C25	1-900113-002	Capacitor, variable, ceramic, 1.7 pF to 11 pF, 500 V dc	91293	9301
C26	1-900001-013	Capacitor, fixed, plastic, 0.1 uF, ±20%, 250 V dc	73445	C280AE
C27	1-900003-035	Capacitor, fixed, mica 160 pF, ±5%, 500 V dc	72136	DM15
C28	1-900003-010	Capacitor, fixed, mica, 15 pF, ±5%, 500 V dc	72136	DM15
C29	1-900003-048	Capacitor, fixed, mica, selected, 500 pF nominal, ±5%, 500 V dc	72136	DM15
C30	1-900003-047	Capacitor, fixed, mica, 470 pF, ±5%, 500 V dc	72136	DM15
C31	1-900003-022	Capacitor, fixed, mica, 50 pF, ±5%, 500 V dc	72136	DM15
C32	1-900113-002	Capacitor, variable, ceramic, 1.7 pF to 11 pF, 500 V dc	91293	9301
C33	1-900001-001	Capacitor, fixed, plastic, 0.01 uF, ±20%, 250 V dc	73445	C280AE
C34	1-900003-030	Capacitor, fixed, mica, selected, 100 pF nominal, ±5%, 500 V dc	72136	DM15
C35	1-900003-047	Capacitor, fixed, mica, 470 pF, ±5%, 500 V dc	72136	DM15
C36	1-900003-010	Capacitor, fixed, mica, 15 pF, ±5%, 500 V dc	72136	DM15
C37	1-900003-030	Capacitor, fixed, mica, 100 pF, ±5%, 500 V dc	72136	DM15
C38		Not used		
C39	1-900063-001	Capacitor, variable, glass, 1.0 pF to 10 pF, 500 V dc	91293	7341A
C40	1-900044-001	Capacitor, fixed, stand-off, 470 pF, –0% +100%, 500 V dc	01121	SS5D471W
C41	1-900003-004	Capacitor, fixed, mica, 5 pF, ±10%, 500 V dc	72136	DM15
C42	1-900098-003	Capacitor, fixed, mica, selected, 3 pF nominal, ±10%, 500 V dc	72136	DM5-030K
C43	1-900045-001	Capacitor, fixed, feed-thru, 470 pF, ±20%, 500 V dc	01121	FA5C4712
C44	1-900098-005	Capacitor, fixed, mica, 5 pF, ±10%, 500 V dc	72136	DM5-050K
C45	1-900063-001	Capacitor, variable, glass, 1.0 pF to 10 pF, 500 V dc	91293	7341A
C46	1-900001-001	Capacitor, fixed, plastic, 0.01 uF, ±20%, 250 V dc	73445	C280AE
CR1	1-913074-001	Diode, silicon, Vr=20 V, If=100 mA	80795	ITT244
CR2	1-913074-001	Diode, silicon, Vr=20 V, IF=100 mA	80795	ITT244

Table 3-8. Parts List for 700 MHz Multiplier Assembly, A1A5 (Cont.)

Ref. Desig.	AILTECH Part No.	Description	Mfr. Code No.	Mfr. Part No.
L1	1-906006-009	Inductor, variable, 0.22 uH to 0.34 uH	88869	
L2	1-402965-001	Inductor, fixed, 2-1/2 turns	88869	
L3	1-402965-001	Inductor, fixed, 2-1/2 turns	88869	
L4	1-402965-001	Inductor, fixed, 2-1/2 turns	88869	
L5	1-403499-001	Inductor, fixed, 2-1/2 turns	88869	
L6	1-403774-001	Inductor, fixed, 1 turn	88869	
L7	1-201741-002	Inductor, fixed, 1 turn	88869	
L8	1-201741-001	Inductor, fixed, 1 turn	88869	
Q1	1-958000-001	Transistor, silicon, NPN	04713	2N3904-5
Q2	1-958000-001	Transistor, silicon, NPN	04713	2N3904-5
Q3	1-958018-001	Transistor, silicon, NPN	49675	2N5179
Q4	1-958018-001	Transistor, silicon, NPN	49675	2N5179
Q5	1-958018-001	Transistor, silicon, NPN	49675	2N5179
Q6	1-958018-001	Transistor, silicon, NPN	49675	2N5179
Q7	1-958018-001	Transistor, silicon, NPN	49675	2N5179
R1	1-945007-003	Resistor, variable, composition, 500 ohm, ±30%, 1/5 W	71450	X201
R2	1-945000-048	Resistor, fixed, composition, 8.2 kilohm, ±10%, 1/4 W	01121	CB8221
R3	1-945000-037	Resistor, fixed, composition, 1.0 kilohm, ±10%, 1/4 W	01121	CB1021
R4	1-945000-025	Resistor, fixed, composition, 100 ohm, ±10% 1/4 W	01121	CB1011
R5	1-945000-033	Resistor, fixed, composition, 470 ohm, ±10%, 1/4 W	01121	CB4711
R6	1-945000-024	Resistor, fixed, composition, 82 ohm, ±10%, 1/4 W	01121	CB8201
R7	1-945000-183	Resistor, fixed, composition, 7.5 kilohm, ±5%, 1/4 W	01121	CB7525
R8	1-945000-171	Resistor, fixed, composition, 2.4 kilohm, ±5%, 1/4 W	01121	CB2425
R9	1-945000-031	Resistor, fixed, composition, 330 ohm, ±10%, 1/4 W	01121	CB3311
R10	1-945000-033	Resistor, fixed, composition, 470 ohm, ±10%, 1/4 W	01121	CB4711
R11	1-945000-183	Resistor, fixed, composition, 7.5 kilohm, ±5%, 1/4 W	01121	CB7525
R12	1-945000-165	Resistor, fixed, composition, 1.3 kilohm, ±5%, 1/4 W	01121	CB1325

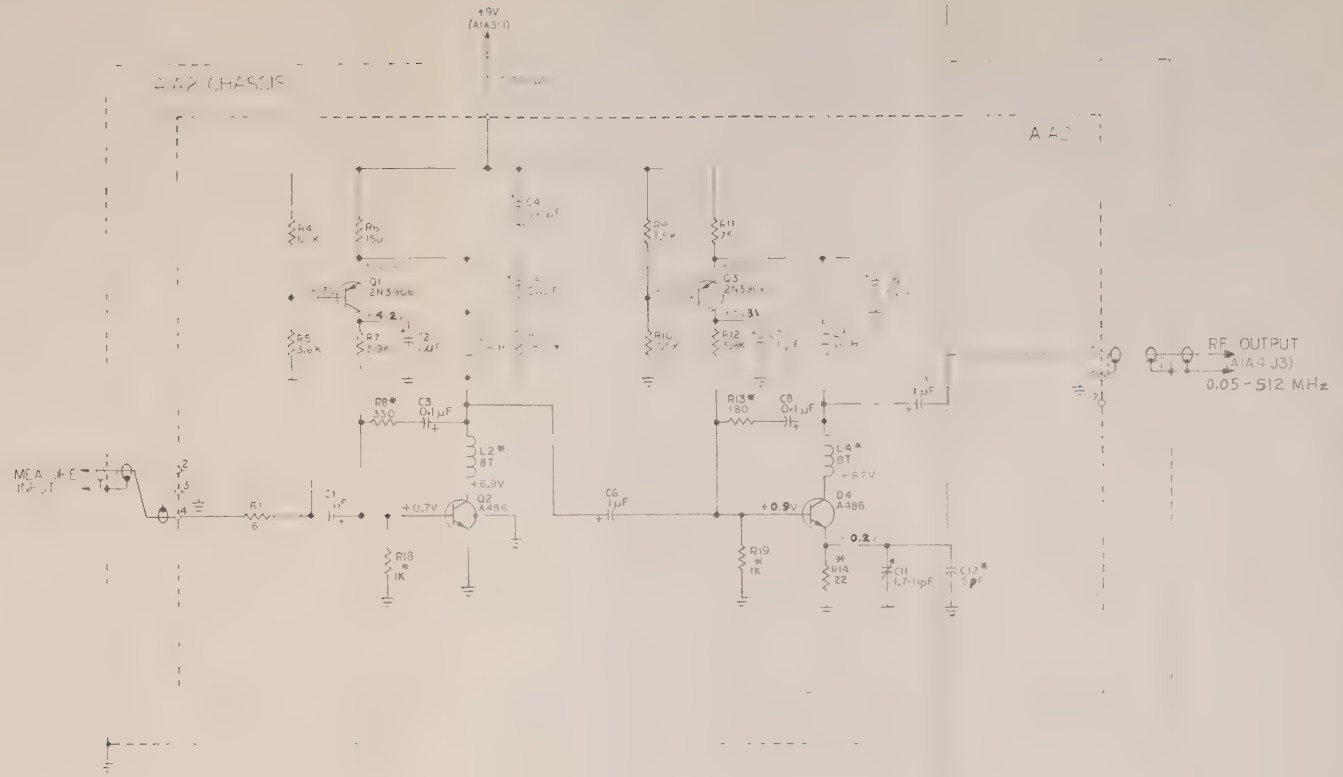
Table 3-8. Parts List for 700 MHz Multiplier Assembly, A1A5 (Cont.)

Ref. Desig.	AILTECH Part No.	Description	Mfr. Code No.	Mfr. Part No.
R13	1-945000-025	Resistor, fixed, composition, 100 ohm, ±10%, 1/4 W	01121	CB1011
R14	1-945000-025	Resistor, fixed, composition, 100 ohm, ±10%, 1/4 W	01121	CB1011
R15	1-945000-047	Resistor, fixed, composition, 6.8 kilohm, ±10%, 1/4 W	01121	CB6821
R16	1-945000-036	Resistor, fixed, composition, 820 ohm, ±10%, 1/4 W	01121	CB8211
R17	1-945000-021	Resistor, fixed, composition, selected, 47 ohm nominal, 10%, 1/4 W	01121	CB4701
R18	1-945000-183	Resistor, fixed, composition, 7.5 kilohm, ±5%, 1/4 W	01121	CB7525
R19	1-945000-165	Resistor, fixed, composition, 1.3 kilohm, ±5%, 1/4 W	01121	CB1325
R20	1-945000-025	Resistor, fixed, composition, 100 ohm, ±10%, 1/4 W	01121	CB1011
R21	1-945000-025	Resistor, fixed, composition, 100 ohm, ±10%, 1/4 W	01121	CB1011
R22	1-945000-021	Resistor, fixed, composition, selected, 47 ohm nominal, ±10%, 1/4 W	01121	CB4701
R23	1-945000-183	Resistor, fixed, composition, 7.5 kilohm, ±5%, 1/4 W	01121	CB7525
R24	1-945000-165	Resistor, fixed, composition, 1.3 kilohm, ±5%, 1/4 W	01121	CB1325
R25	1-945000-025	Resistor, fixed, composition, 100 ohm, ±10%, 1/4 W	01121	CB1011
R26	1-945000-019	Resistor, fixed, composition, 33 ohm, ±10%, 1/4 W	01121	CB3301
R27	1-945000-049	Resistor, fixed, composition, 10 kilohm, ±10%, 1/4 W	01121	CB1031
R28	1-945000-055	Resistor, fixed, composition, selected, 33 kilohm nominal, ±10%, 1/4 W	01121	CB3331
R29	1-945000-025	Resistor, fixed, composition, 100 ohm, ±10%, 1/4 W	01121	CB1011
R30	1-945000-021	Resistor, fixed, composition, 47 ohm, ±10%, 1/4 W	01121	CB4701
U1	1-926007-026	Integrated circuit, balanced mixer	01295	SN76514N
W1	1-999000-102	Wire, stranded, red, 24 gauge	04946	1WT221934
Y1	1-403562-001	Crystal, 10 MHz	88869	

Table 3-9. Parts List for Diode Switch Assembly, A1A6

Ref. Desig.	AILTECH Part No.	Description	Mfr. Code No.	Mfr. Part No.
C1	1-900045-001	Capacitor, fixed, feed-thru, 470 pF, ±20%, 500 V dc	01121	FA5C4712
C2	1-900045-001	Capacitor, fixed, feed-thru, 470 pF, ±20%, 500 V dc	01121	FA5C4712
C3	1-900012-003	Capacitor, fixed, ceramic, 0.01 uF, −20% +80%, 300 V dc	72982	851Z5U103Z
C4	1-900115-005	Capacitor, fixed, electrolytic, 2.2 uF, ±20%, 15 V dc	12954	D2RGS1D15M
C5	1-900044-001	Capacitor, fixed, standoff, 470 pF, −0% +100%, 500 V dc	01121	SS5D471W
C6	1-900003-048	Capacitor, fixed, mica, 500 pF, ±5%, 500 V dc	72136	DM15
C7	1-900044-001	Capacitor, fixed, standoff, 470 pF, −0% +100%, 500 V dc	01121	SS5D471W
C8	1-900003-048	Capacitor, fixed, mica, 500 pF, ±5%, 500 V dc	72136	DM15
C9	1-900012-003	Capacitor, fixed, ceramic, 0.01 uF, −20% +80%, 300 V dc	72982	851Z5U103Z
C10	1-900115-005	Capacitor, fixed, electrlytic, 2.2 uF, ±20%, 15 V dc	12954	D2R2GS1D15M
CR1	1-913005-001	Diode, germanium, Vr=30 V, If=100 mA	03877	1N273
CR2	1-913085-001	Diode, silicon, Vr=75 V, If=20 mA	50273	1N3062
CR3	1-913085-001	Diode, silicon, Vr=75 V, If=20 mA	50273	1N3062
CR4	1-913085-001	Diode, silicon, Vr=75 V, If=20 mA	50273	1N3062
CR5	1-913085-001	Diode, silicon, Vr=75 V, If=20 mA	50273	1N3062
J1	1-910005-001	Connector, jack, BNC, bulkhead	11636	MIL-C3608
Q1	1-958000-002	Transistor, N-channel, J-FET	04713	2N5458
R1	1-945000-053	Resistor, fixed, composition, 22 kilohm, ±10%, 1/4 W	01121	CB2231
R2	1-945000-133	Resistor, fixed, composition, 470 ohm, ±5%, 1/4 W	01121	CB4715
R3	1-999001-007	Resistor, fixed, composition, selected, (may be wire, tinned bus, 22 gauge)	04946	Conforms to QQ-W-343
R4		Not used		
R5	1-945000-049	Resistor, fixed, composition, 10 ohm, ±10%, 1/4 W	01121	CB1001
R6	1-945000-034	Resistor, fixed, composition, 560 ohm, ±10%, 1/4 W	01121	CB5611
R7	1-945000-038	Resistor, fixed, composition, 1.2 kilohm, ±10%, 1/4 W	01121	CB1221
R8	1-945000-038	Resistor, fixed, composition, 1.2 kilohm, ±10%, 1/4 W	01121	CB1221

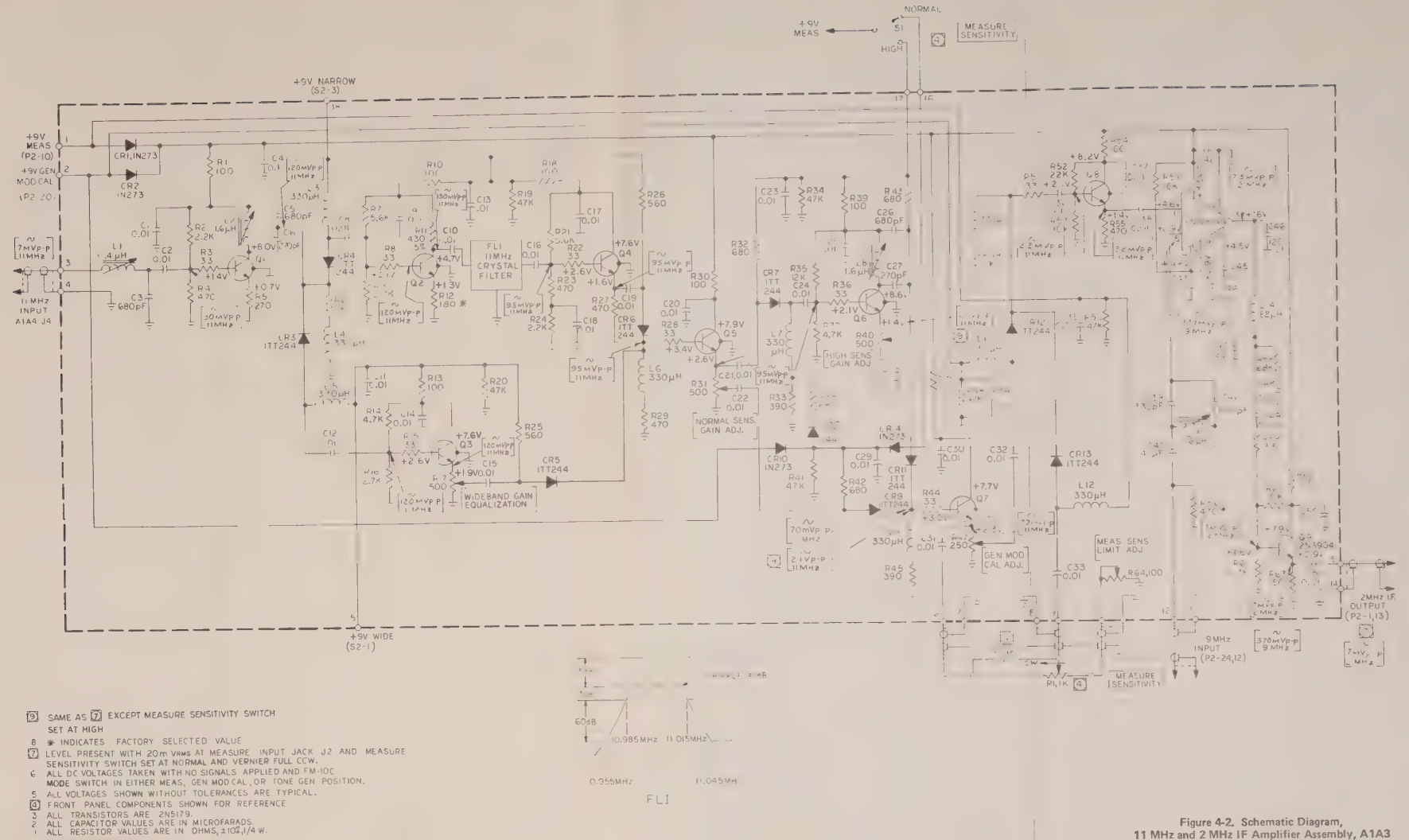
Section IV
SCHEMATIC DIAGRAMS



5. ALL DC VOLTAGES TAKEN WITH NO SIGNALS APPLIED
4. VOLTAGES SHOWN WITHOUT TOLERANCES ARE TYPICAL
3. PARTIAL REFERENCE DESIGNATORS SHOWN (A1A2 BOARD). FOR COMPLETE DESIGNATION, PREFIX WITH ASSY Nº A1A2; EXAMPLE: A1A2C3.
2. * DENOTES FACTORY SELECT VALUE; MAY BE OMITTED.
1. ALL RESISTOR VALUES ARE IN OHMS, ±5%, 1/4W.

NOTES: UNLESS OTHERWISE SPECIFIED

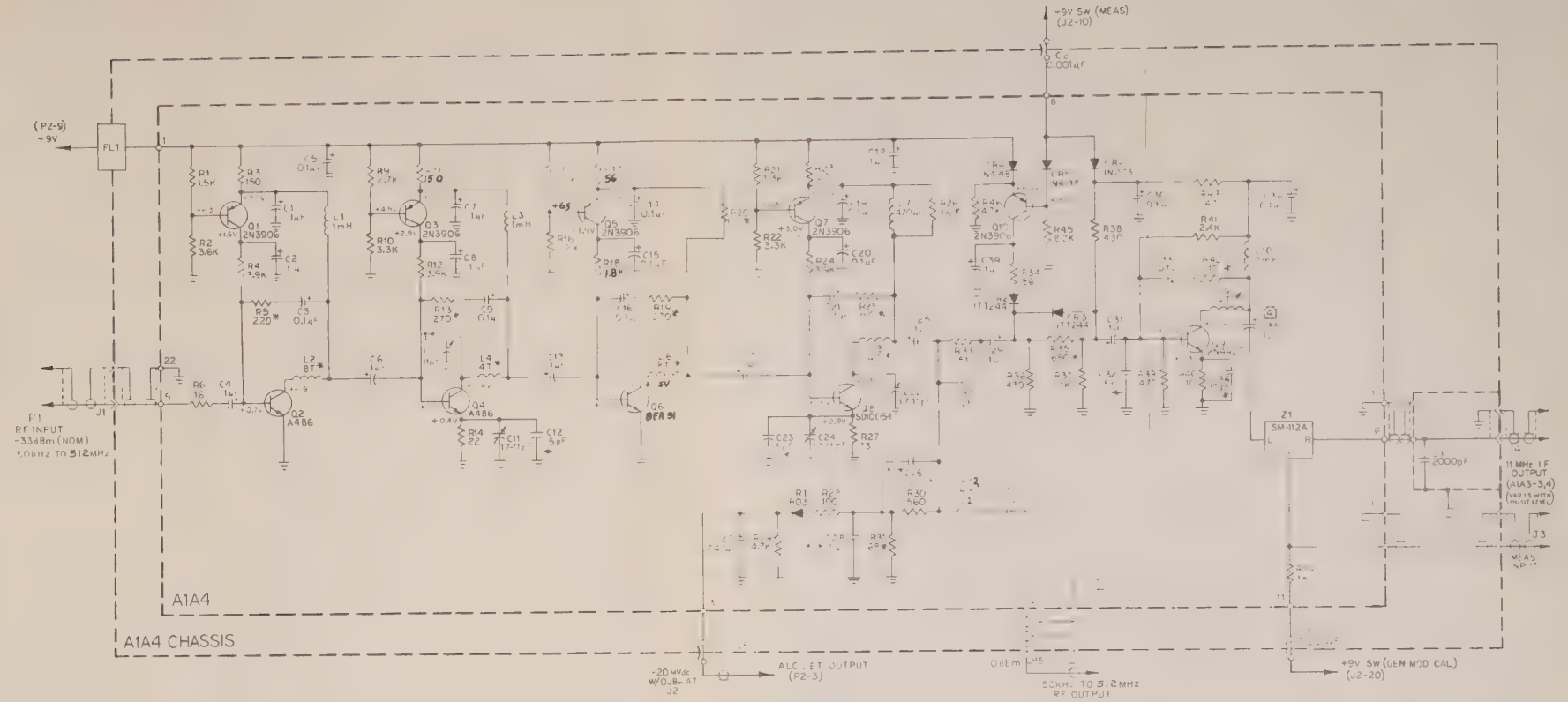
Figure 4-1. Schematic Diagram, Broadband Amplifier Assembly, A1A2
Dwg. No. 4-501355-001(C)



9. SAME AS 7 EXCEPT MEASURE SENSITIVITY SWITCH SET AT HIGH
8. * INDICATES FACTORY SELECTED VALUE
7. LEVEL PRESENT WITH 20m Vrms AT MEASURE INPUT JACK J2 AND MEASURE SENSITIVITY SWITCH SET AT NORMAL AND VERNIER FULL CCW.
6. ALL DC VOLTAGES TAKEN WITH NO SIGNALS APPLIED AND FM-10C MODE SWITCH IN EITHER MEAS, GEN MOD CAL, OR TONE GEN POSITION.
5. ALL VOLTAGES SHOWN WITHOUT TOLERANCES ARE TYPICAL.
4. FRONT PANEL COMPONENTS SHOWN FOR REFERENCE
3. ALL TRANSISTORS ARE 2N5179.
2. ALL CAPACITOR VALUES ARE IN MICROFARADS.
1. ALL RESISTOR VALUES ARE IN OHMS, ±10%, 1/4 W.

NOTES UNLESS OTHERWISE SPECIFIED

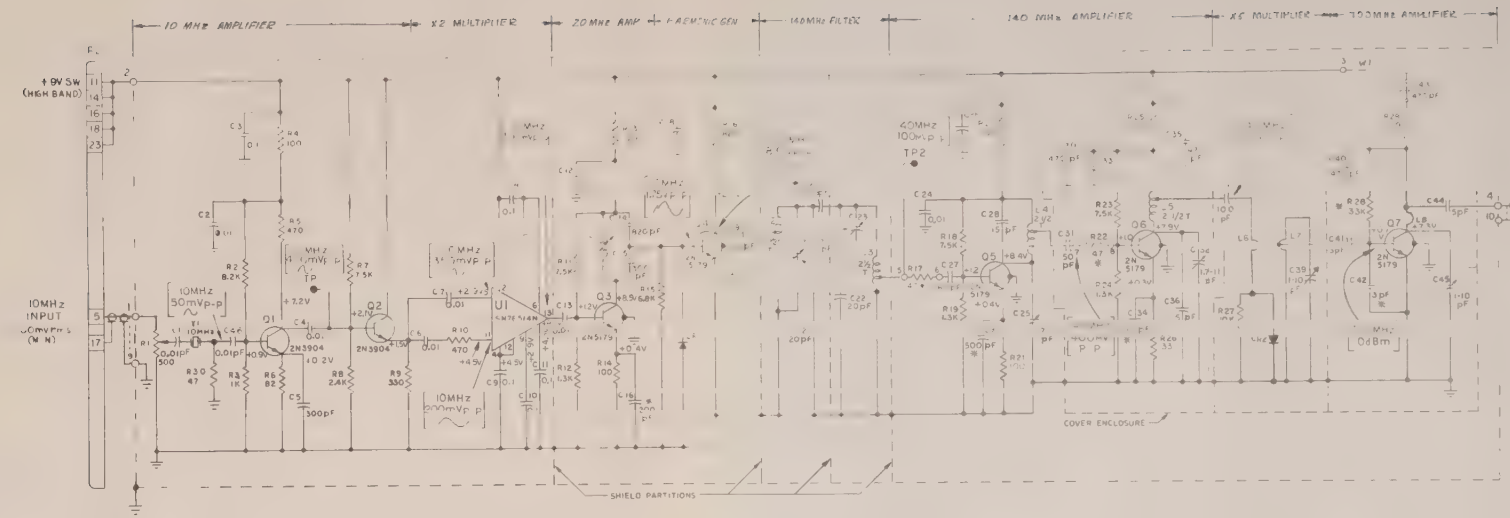
Figure 4-2. Schematic Diagram, 11 MHz and 2 MHz IF Amplifier Assembly, A1A3 Dwg. No. 4-501364-001(D)



7. ✳ DENOTES FACTORY SELECTED VALUE, MAY BE OMITTED.
6. ALL D.C. VOLTAGES TAKEN WITH NO SIGNALS APPLIED. (DISABLE INT. TIME BASE)
5. VOLTAGES SHOWN WITHOUT TOLERANCES ARE TYPICAL.
4. TO BE LEFT OFF AT ASSEMBLY & INSTALLED DURING TEST.
3. PARTIAL REFERENCE DESIGNATORS SHOWN (A1A4 BOARD) FOR COMPLETE DESIGNATION, PREFIX WITH ASSY NO. A1A4. EXAMPLE: A1A4C3
2. ✳ DENOTES FACTORY SELECT VALUE.
1. ALL RESISTOR VALUES ARE IN OHMS, ±5%, 1/4W

NOTES: UNLESS OTHERWISE SPECIFIED

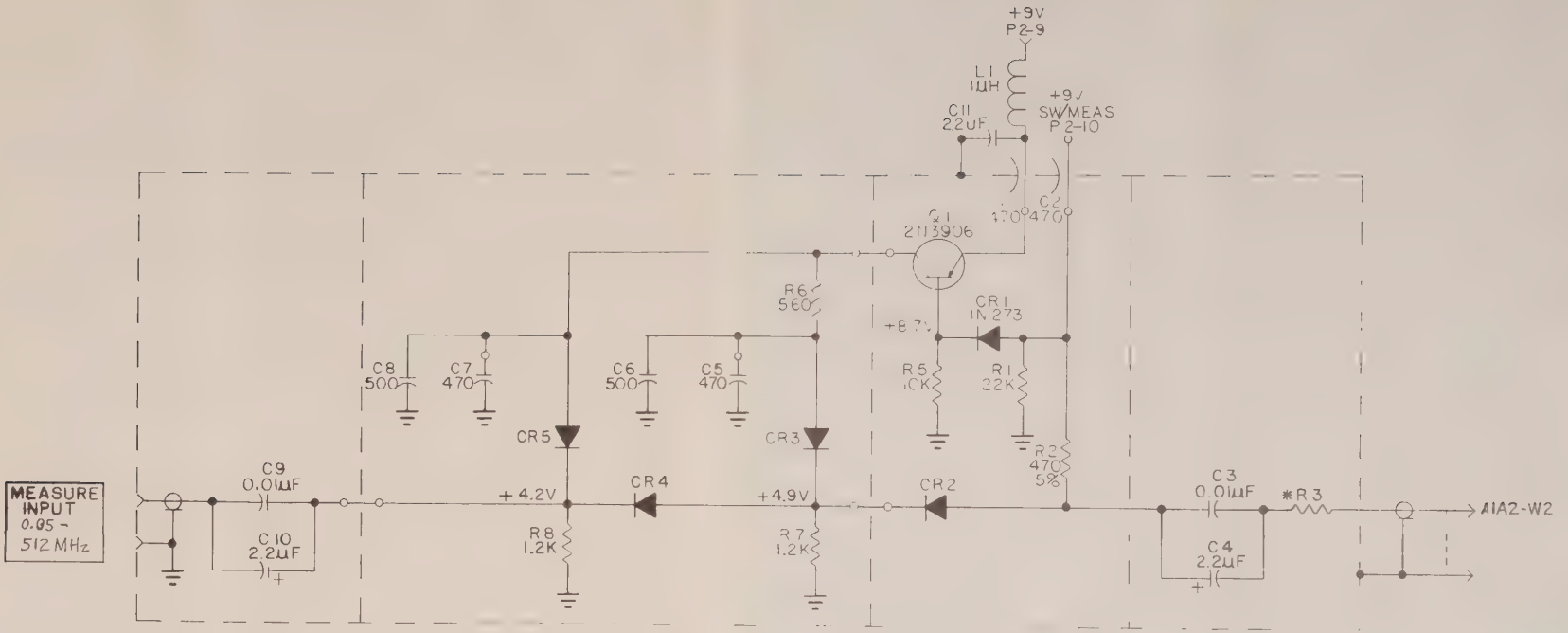
Figure 4-3. Schematic Diagram, Broadband Amplifier and Doubly Balanced Mixer Assembly, A1A4
Dwg. No. 4-501317-001(J)



6. PARTIAL REFERENC DESIGNATIONS ARE SHOWN FOR COMPLETE DESIGNATION PREFIX WITH UNIT Nº OR SUBASSEMBLY DESIGNATION(S).
5. VOLTAGES SHOWN WITHOUT TOLERANCES ARE TYPICAL (FM-10C 100MHz SWITCH IN POSITIONS 8 THRU 12.)
4. DIODES ARE 1T244.
3. * INDICATES NOMINAL VALUE, EXACT VALUE DETERMINED AT TEST
2. CAPACITOR VALUES IN MICROFARADS
1. RESISTOR VALUES IN OHMS, ±5%, ¼W

NOTES UNLESS OTHERWISE SPECIFIED

Figure 4-4. Schematic Diagram, 700 MHz Multiplier Assembly, A1A5 Dwg. No. 4-501296-001(A)



5. ALL CAPACITORS ARE IN PICOFARADS.
4. * SELECTED AT TEST, NOMINAL JUMPER WIRE.
3. ALL VOLTAGES TAKEN IN MEASURE MODE.
2. ALL DIODES ARE IN3062.
1. ALL RESISTORS ARE IN OHMS 1/4 W, 10%.

NOTES: UNLESS OTHERWISE SPECIFIED

Figure 4-5. Schematic Diagram, Diode Switch Assembly, A1A6 Dwg. No. 3-501454-001(A)

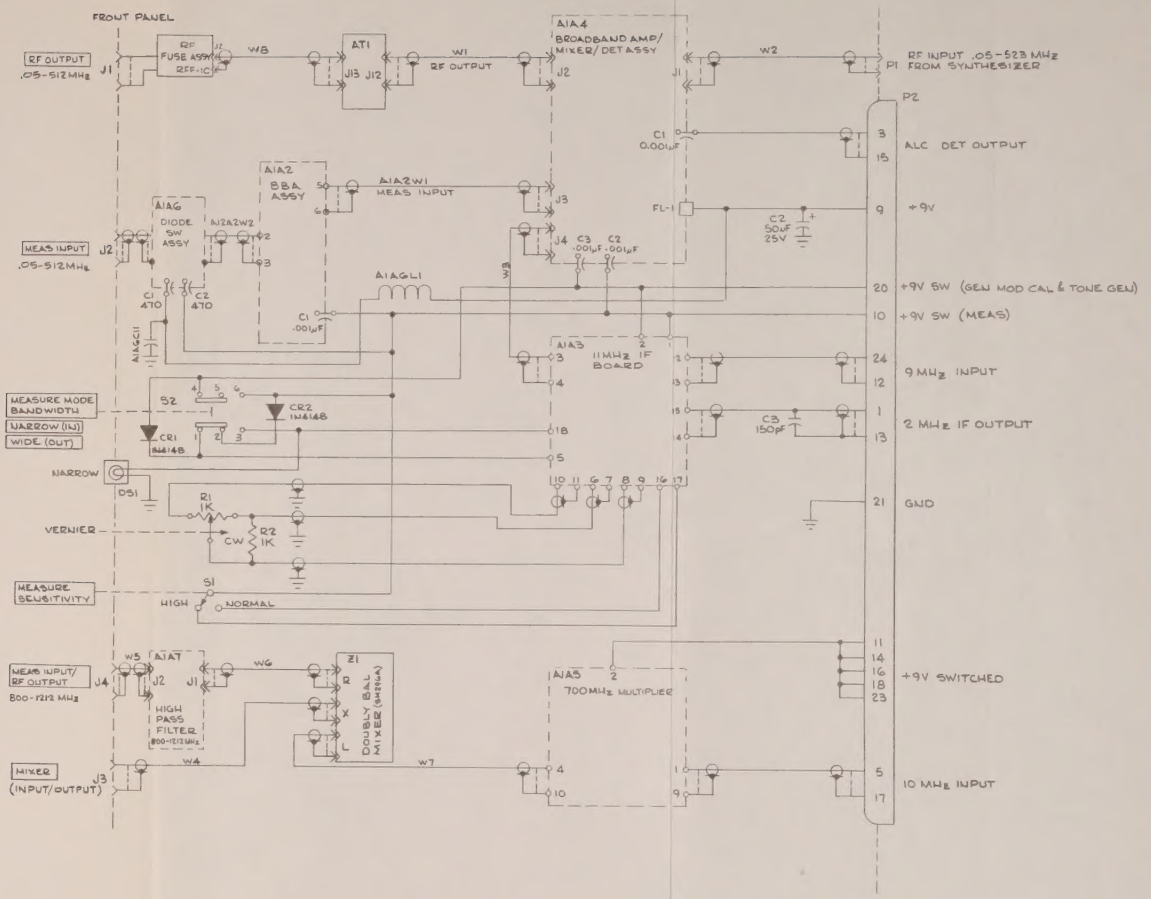


Figure 4-6. Wiring Diagram, Model RFM-10E Dwg. No. 4-501651-00(A)